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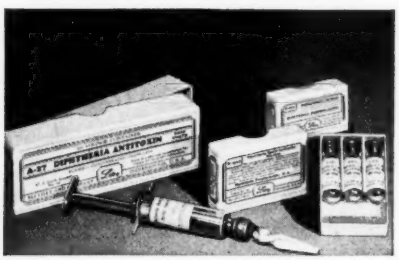

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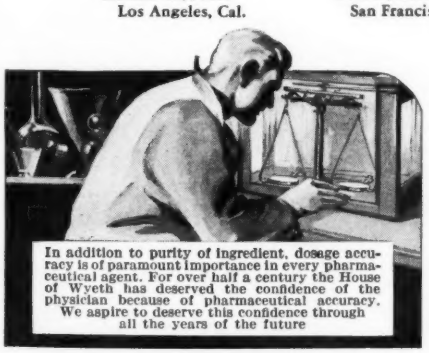

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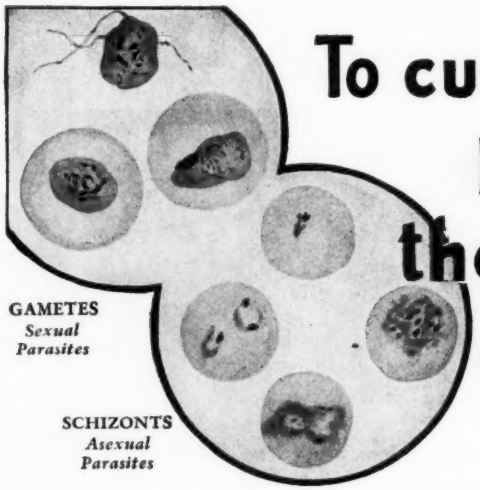

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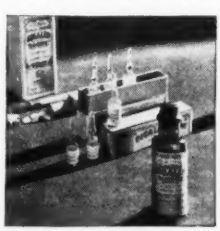

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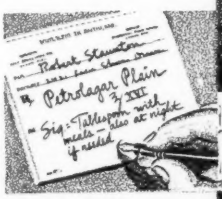

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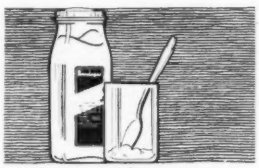
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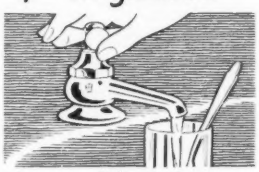
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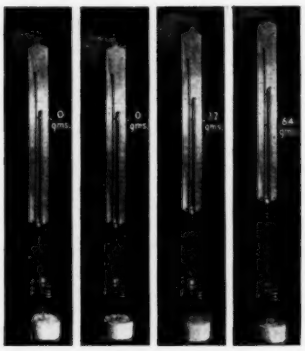

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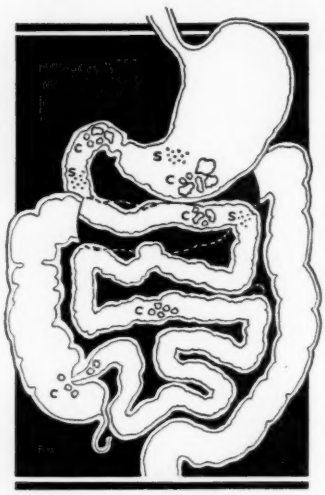

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[1] Marriott: Infant Nutrition, pg. 49.

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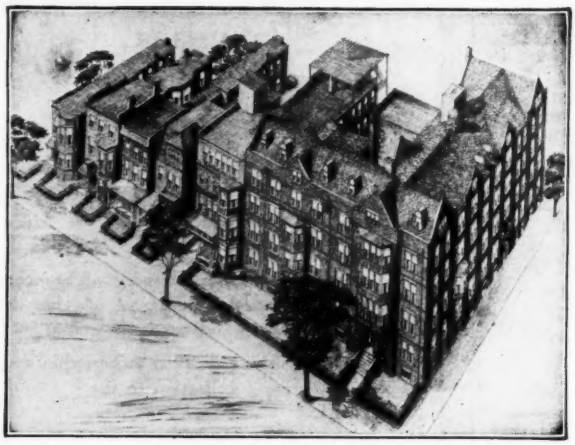

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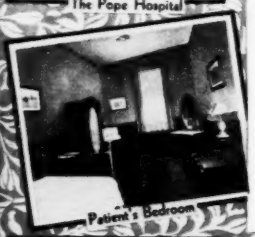
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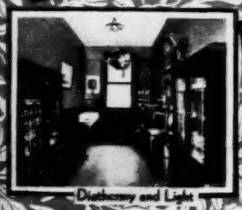
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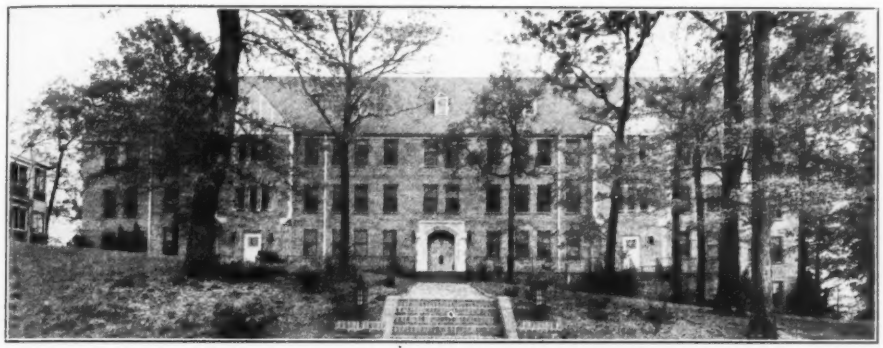

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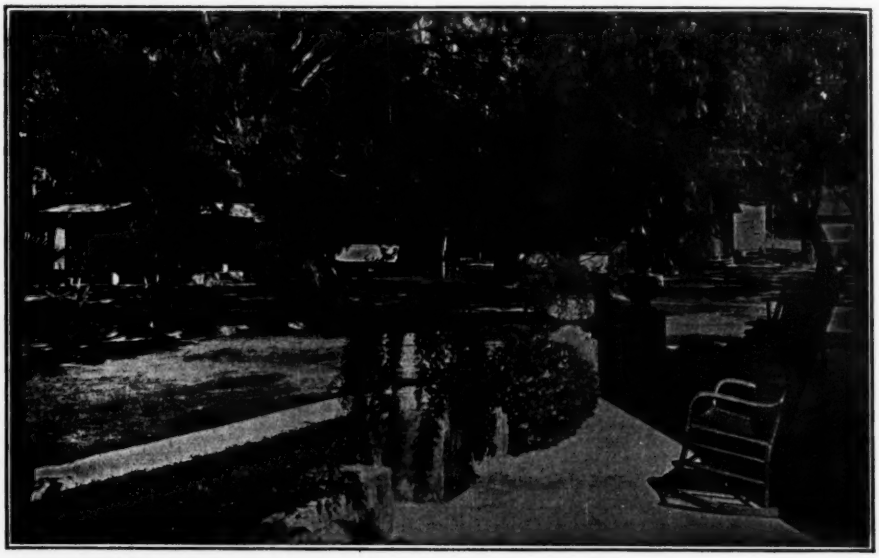

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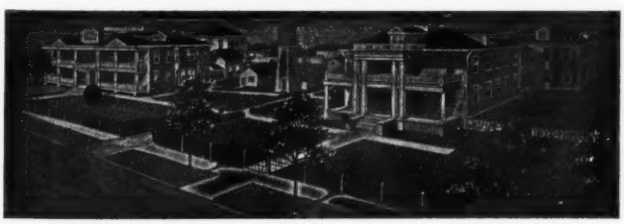

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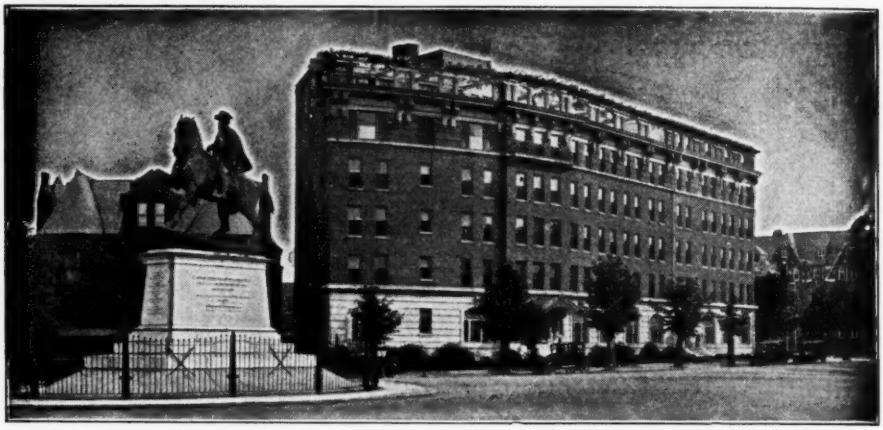

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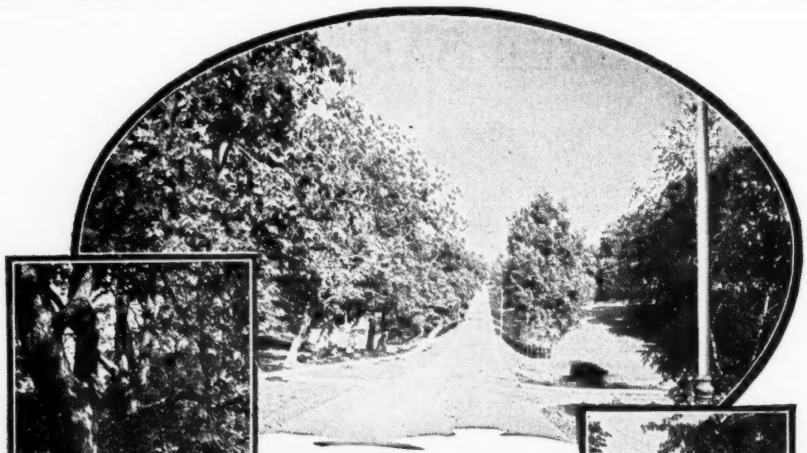

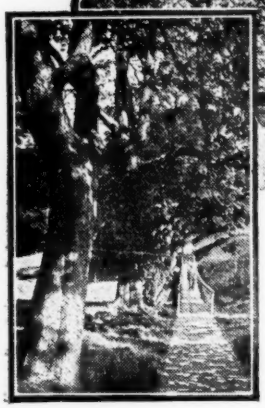

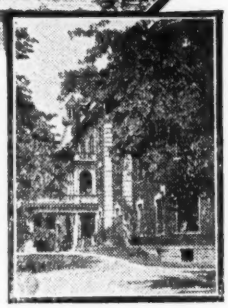

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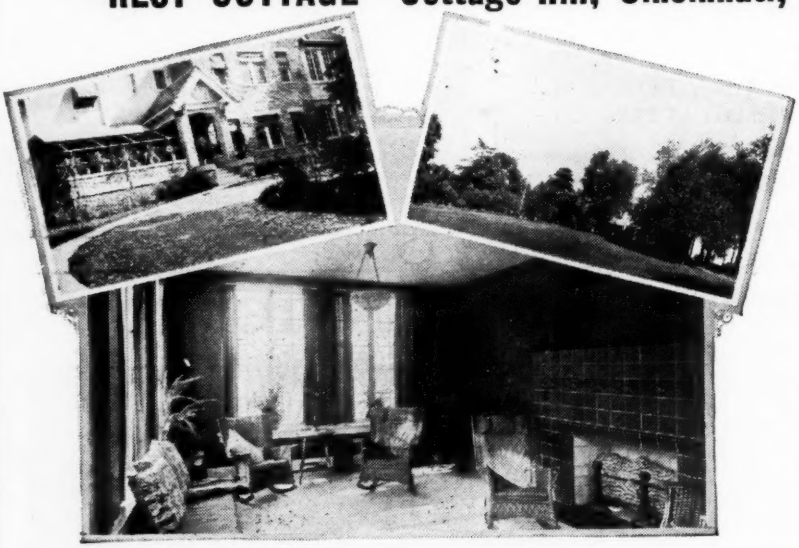

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Volume XXV SEPTEMBER 1932 Number 9

IS ISO-SKIN GRAFTING PRACTICABLE?*

By EARL C. PADGETT, M.D.,
Kansas City, Mo.

Although the fatuity of the medical critic is proverbial, no other guide than experience remains to aid one in passing judgment upon the opinions of others. As the medical literature of the transplantation of tissues is fairly well encumbered with mythology, one may excuse the press now-a-days for some misstatement of fact. Occasionally even quite competent surgeons are tempted to play up to the wondering delight of a credulous laity, some of whom, in the words of Holman,[1] "enjoy contributing small areas of skin as a sacrificial offering on the alter of self-inflicted martyrdom." But at the present time it may be emphasized that there is an abundance of both experimental and practical evidence that homotransplantation of tissue is only temporary except possibly in identical twins.

ISO OR HOMOTRANSPLANTATION

The earlier operators made attempts to graft from other individuals, but in the second half of the last century Ollier and Thiersch[2] observed that autotransplants of skin were most often successful. According to Loeb[3] it was recognized at that time that different species and different individuals might differ in their chemical constitutions. A review of the literature of homotransplantation of skin, the type of skin transplantation with which we are particularly interested in this communication, reveals a surprising disagreement in findings.

Lexer,[4] Freeman,[5] Perthes,[6] Holman[1] and Blair[7] have only failures to report with isodermic grafts. On the contrary, Davis,[8] who based his statements of the feasibility of the procedure on hospital records by interns, vouches for the practical value of the procedure. Masson[9] recommended for success the same procedure of obtaining a donor as for a successful blood transfusion, but in his report nothing is said about the length of time the cases were observed. Shawan[10] also attests to the success of the procedure when a proper blood-matched donor is used. A great many other less authentic records can be culled from the literature, the authors of which apparently thought they had had some success with homografting of skin. Usually the length of time these grafts were observed is not tabulated. In all probability this is the reason for what we believe must have been misobservations.

EXPERIMENTAL RESULTS

Our own experience with homotransplantation of skin is based upon a series of 44 transplants of skin performed upon persons of varying ages. Twenty-one were free full thickness skin grafts and 23 were thin grafts or the so-called "Thiersch" grafts. Grafts of a size of 1 to 2 cm. in diameter were transplanted for experimental purposes in all but ten instances. In the latter ten instances an honest effort was made to cover a raw area for which there was inadequate skin for autotransplantation. The first one of these cases was a case of Blair's (1921) and the second was a case of our own (1929). Both resulted in failure. The 8 other cases were done by other surgeons and the failure was known or observed by us. These results stimulated the experimental transplantation of skin in 34 instances for our own information. As the blood group had been stated to have a determining influence upon whether or not a homotransplant "took" and whether or not it ultimately thrived, in each of our experimental cases it was determined. The blood group was also determined in Blair's case and our own case.

The table which follows gives the date of the graft, type of graft, blood group of the donor and of the recipient and the appearance of the graft as long as it remained *in situ*.

Four skin grafts were transplanted from one identical twin to the other and vice versa. This represents the closest possible syngenesiotransplantation (near relative, as brother to brother,

*Read in Section on Pathology, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

*From the Surgical Department of the University of Kansas Medical School.

From	To	Date	Type	Blood Group Donor	Blood Group Recipient	Seventh Day	Fourteenth Day	Twenty-First Day	Twenty-Eighth Day	Thirty-Fifth Day	Forty-Second Day	Note
1. Goetz (45)	McDaniel (70)	8- 3-31	Wolff	Group I	Group IV	Gray	Separated					
2. Bradley (50)	McDaniel (70)	8- 3-31	Wolff	Group IV	Group IV	Gray	Separated					
3. Cole (40) (Negro)	McDaniel (70)	8- 3-31	Wolff	Group IV	Group IV	Pink	Separating Pigment off	Separated				
4. McDaniel (70)	Goetz (45)	8- 3-31	Wolff	Group IV	Group I	Pink; take	Dark red	Separated				
5. Bradley (50)	Goetz (45)	8- 3-31	Wolff	Group IV	Group I	Pink; take	Dark red	Separated				
6. Cole (40) (Negro)	Goetz (45)	8- 3-31	Wolff	Group IV	Group I	Pink; take	Dark red	Pink	Separated			
7. Lafferty (42)	Goetz (45)	8- 3-31	Thiersch	Group II	Group I	Pink; take	Pink	Pink	Pink	Separating	Separated	
8. Padgett (38)	Goetz (45)	8- 3-31	Thiersch	Group IV	Group I	Pink; take	Pink	Pink	Almost gone	Separated		
9. Spangler (35)	Son (5)	-29	Thiersch	Group	Group	Pink; take	Pink	Dark red to black	Separated			
10. Lafferty (42)	Root (60)	7-15-31	Thiersch	Group II	Group IV	Gray; no take	Separated		Separated			
11. Root (60)	Lafferty (42)	7-15-31	Thiersch	Group IV	Group II	Pink; take	Pink	Take	Take	Separating	Separated	
12. Ruby Tucker (19)	Nastaz (1)	8-11-31	Thiersch	Group IV	Group II	Pink; take	Pink	Take	Take	Separating	Separated	
13. Ruth Tucker (19)	Nastaz (1)	8-11-31	Thiersch	Group IV	Group II	Pink; take	Pink		Separated			
14. Nastaz (1)	Tucker (19)	8-11-31	Thiersch	Group II	Group IV	Red; take	Pink	Take	Separating	Separated		
15. Nastaz (1)	Tucker (19)	8-11-31	Thiersch	Group II	Group IV	Red; take		Take	Take	Separated		
16. Ruby Tucker (19)	Tucker (19)	8-11-31	Thiersch	Group IV	Group IV	Pink; take	Pink	Take	Take	Take	Take	Present three months
17. Ruth Tucker (19)	Tucker (19)	8-11-31	Thiersch	Group IV	Group IV	Pink; take	Pink	Take	Take	Take	Take	Present three months
18. Windley (40)	Petullo (1)	8-26-31	Thiersch	Group I	Group IV	Pink; take	Take	Separated				
19. Petullo (1)	Lindley (40)	8-26-31	Thiersch	Group IV	Group I	Pink; take	Separated					
20. LeClera (6)	Powell (40)	9- 3-31	Wolff	Group II	Group II	Pink; take	Take		Separated			
21. LeClera (6)	Kittle (7)	9- 3-31	Wolff	Group II	Group II	Pink; take	Take		Separated			
22. Powell (40)	LeClera (6)	9- 3-31	Wolff	Group II	Group II	Pink; take	Take	Separated	Separated			
23. Powell (40)	Kittle (7)	9- 3-31	Wolff	Group II	Group II	Pink; take	Take		Separated			
24. Kittle (7)	LeClera (6)	9- 3-31	Wolff	Group II	Group II	Pink; take	Take	Separated				
25. Kittle (7)	Powell (40)	9- 3-31	Wolff	Group II	Group II	Pink; take	Take	Take	Separated			
26. F. Judd (2)	T. Judd (1 mo.)	10- 8-31	Thiersch	Group IV	Group IV	Pink; take	Take	Take	Take	Separating	Separated	
27. T. Judd (1 mo.)	J. Judd (2)	10- 8-31	Thiersch	Group IV	Group IV	Pink; take	Take	Take	Take	Separating	Separated	
28. Pottorf (50)	Allison (2)	10-16-31	Wolff	Group II	Group IV	Gray; no take						

29. Gilbreath (70)	Allison (2)	10-16-31	Wolff	Group II	Group IV	Gray; no take		Separated	Separated		
30. Newsom (1 mo.)	Allison (2)	10-16-31	Wolff	Group IV	Group IV	Pink; take	Take	Separated	Separated		
31. Allison (2)	Pottorf (50)	10-16-31	Wolff	Group IV	Group II	Pink; take	Take	Separated	Separated		
32. Allison (2)	Gilbreath (70)	10-16-31	Wolff	Group IV	Group II	Pink; take	Take	Separated	Separated		
33. Allison (2)	Newsom (1 mo.)	10-16-31	Wolff	Group IV	Group IV	Take	Take	Take	Take	Separated	
34. R. Desmond (11)	F. Desmond (11)	9-15-31	Thiersch	Group III	Group III	Pink; take	Take	Take	Take	Take	Present two months
35. F. Desmond (11)	R. Desmond (11)	9-15-31	Thiersch	Group III	Group III	Pink; take	Take	Take	Take	Take	Present two months
36. Blair (45)	Daughter (5)	1921	Wolff	Group I	Group IV	Pink; take	No take	Separated	Separated		
37. Sister (12)	Hendricks (6)	1926	Thiersch	Group		Pink; take	No take	Separated	Separated		
38. Sister (10)	Hendricks (6)	1926	Thiersch	Group		Pink; take	No take		Separated		When seen, date undetermined, about 4 wks.
39. Father	Boyd (10)	9- 1-26	Thiersch						Separated		When seen, date undetermined, about 4-5 wks.
40. Mr. Fouts	Boyd (10)	9- 7-26	Thiersch						Separated		When seen, date undetermined, about 4-5 wks.
41. Father	Boyd (10)	9-16-26	Thiersch						Separated		When seen, date undetermined, about 4-5 wks.
42. Mr. Fouts	Boyd (10)	9-23-26	Thiersch						Separated		When seen, date undetermined, about 4-5 wks.
43. Mr. Clark	Boyd (10)	9-30-26	Thiersch						Separated		When seen, date undetermined, about 4-5 wks.
44. Uncle	Boyd (10)	10- 7-26	Thiersch						Separated		When seen, date undetermined, about 4-5 wks.

mother to son) of skin and at present (August 15, 1932) the grafts remain *in situ*, in one set of twins since August 11, 1931, and in the other since September 15, 1931. The usual type of syngenesiotransplantation is represented by three father to son transplants, one mother to daughter transplant, two brother to brother transplants, two sister to brother transplants, and one uncle to nephew transplant. In each case the graft "took" and remained attached and viable for three weeks at a minimum, but before the end of the fifth week was completely destroyed. Blair's case was a Wolff graft from mother to daughter to the axilla. The opposite axilla was also grafted with an autotransplant. At the end of two weeks the homotransplant was pink with new blood and looked better than the autotransplant, but at the end of four weeks the homotransplant had been destroyed. Our own case in which a serious attempt was made to homotransplant skin was a very severe burn of both legs and the father was used as donor for the skin. Large Thiersch grafts were transplanted and a complete "take" was obtained. The thighs and legs were completely covered with the new skin at the end of three weeks, but at the end of five weeks the grafts had disappeared.

Some light may be thrown upon the question of whether or not a homotransplant is more likely to "take" immediately if the blood is matched in the summary of 36 instances in which the blood group was known. In four instances, when the corpuscles of the donor were agglutinated by the serum of the recipient, the grafts did not "take" at any time, but in four other instances the grafts "took" and did as well as any of them for the first few days. In 28 instances when the corpuscles of the donor were not agglutinated by the serum of the recipient, 27 of the grafts took temporarily, and in one an immediate "take" failed. Thus, a faint suggestion is given that immediate "takes" are more probable if the cells of the donor are not ag-

glutinated by the cells of the recipient, but that finally the graft is destroyed in any event unless the relationship is as close as that of identical twins.

HOMOTRANSPLANTATION IN ANIMALS

Transplantation of tissues originally developed to repair surfaces denuded of skin has in recent years assumed great experimental importance. The biologist and embryologist have used the procedure to determine the extent to which development takes place by self-determination in contradistinction to inconstant environmental factors. The physiologist has used the method to determine the function of organs and of their specific excretions. By the biologist and the pathologist, growth phenomena, the origin of specific cells and the relation of normal growth to tumor growth has been studied, and among geneticists Correus[11] has attempted to correlate the data of genetics with that of transplantation.

Rather recently the great importance of the relative nearness of the relationship between the host and the donor as the principal factor that determines the fate of the graft is being recognized in its full significance. Leo Loeb[3] has for a number of years carried on a painstaking investigation in various laboratory animals. His findings have in many ways elucidated the connection of the differences in genetic constitution of the host and the donor as the determinant factor which decided the fate of the graft. As his general findings are applicable for skin, a brief resume of the sequence of events after transplantation of such an organ as the thyroid gland becomes of interest. If the thyroid gland of a rat or guinea pig is autotransplanted, the peripheral part remains alive and the central part becomes necrotic and is replaced by fibroblastic tissue. The peripheral part is vascularized, lives permanently and about it little or no lymphocytic reaction is shown. But in homotransplantations with the same tissue the fibroblastic reaction is more intense and replaces a larger amount of the center of the graft immediately. The fibroblasts form a dense tissue about the living acini in the peripheral zone which compresses the acini and may even destroy them directly. The lymphocytic reaction about the graft is very marked and the lymphocytes surround, invade and help to destroy the tissue. By these means, complete destruction occurs within twenty to thirty days. If, instead of transplanting thyroid tissue to another animal of the same species and variety, the tissue is transplanted to another variety (as white to hooded rats) the result is essentially the same as after homotransplantation, but the fibroblastic and the lymphocytic reaction is more marked and by the twentieth day the transplant is destroyed. When syngenesiotransplantation (between brother and sister or parent and child) is done and thus the relative relationship is diminished to the utmost nearness to that of autotransplantation, the behavior of the host towards the transplant is similar to that of autotransplantation for about five weeks, after which disharmonies between the host and the transplant develop and the transplant is invaded by lymphocytes and eventually overwhelmed. Finally, if instead of transplanting thyroid tissue within the same species, it is transplanted from one species to another (heterotransplantation) the immediate direct injury to the transplant by the body fluids of the host is so great that marked degenerative changes are shown at the end of the first week and not only lymphocytes but polymorphonuclear lymphocytes collect about the transplant and it is destroyed rather quickly.

THEORY OF ORGANISMAL DIFFERENTIALS

On the basis of his experimental work Loeb[3] proposed the theory of organismal differentials as an hypothesis to explain the findings. He states the theory as follows:

> "All or about all tissues in a given individual within a certain species have, in common, certain chemical characteristics which may be designated as the individuality differential; and in a similar manner all the tissues of near relatives, of different strains, varieties, species, genera and classes of animals have, in common, chemical characteristics, which may be designated as syngenesio, strain, variety, species, (hetero), generic and class differentials. These differentials determine the reaction between host and donor."

After transplanting a piece of tissue or an organ into a near relative, or into an unrelated individual of the same species or into an individual of a different species, the individuality differential comes into play and the tissues of the host assume injurious properties and toxins are set in action which destroy the graft. The relationship between the host and the transplant determines in each case the mode of reaction of the host against the transplant.

Experimental work has shown that the substances given off by the graft probably do not act, as a rule at least, in the nature of antigens and call forth the production of secondary (immune) substances on the part of the host which cause the graft to be destroyed. If sec-

ondary (immune) reactions were important, it might be expected that the homoreaction following a second transplantation would appear more promptly, but no acceleration of time seems to occur. The evidence seems to indicate that organismal differentials in homotransplantation are shown by primary substances given off by the graft which act as toxins, and effect the cells of the host in such a manner as to cause the reaction on the part of the host as has been described previously.

THE GENETIC BASIS OF ORGANISMAL DIFFERENTIALS

The hypothesis that these differentials are genetically determined is suggested by the whole series of gradations in reaction found on transplanting tissues into strange hosts. The organismal differentials are more closely related within the same family or species or strain and less disharmony results after transplantation of tissues within the family, species, or strain than after transplantation without family, species or strain. Consequently, transplantations of tissue from brother to brother or brother to sister (close syngenesiotransplantation) remain viable the longest after transplantation. A slight decrease in length of time that the graft remains viable is noted in the case of transplantation of parent to child (a more distant type of syngenesiotransplantation). Experiments in closely inbred animals also show similar varying reactions according to the nearness or distance in relationship of the donor and the host.

Loeb[3] concludes that organismal differentials are genetically determined and says that:

"The conclusion that the organismal differentials are due to the genetic constitution of the organisms is based on the correspondence between the characteristics of the differentials and the relative intensity of the reaction against strange differentials on the one hand, and the genetic relationship of the organism, which are the bearers of the differentials, on the other hand."

Apparently the organismal differentials depend upon the totality of genes which make up the chromosomes and which are present in the cells of the host and the donor and apparently the genes or more specifically gene derivatives determine the character of the differentials. Moreover, the relative strangeness of the genes provides the relative intensities between the tissues of the donor and the host. The Y or sex chromosome must have little to do with this reaction, as it makes little difference whether the host or the donor are of the same sex.

BLOOD GROUPS AND HOMOTRANSPLANTATION OF SKIN

It has been suggested and maintained by Davis,[12] Masson[9] and Shawan[10] that the result of homografting of skin depends upon whether or not the red blood cells of the donor are agglutinated by the serum of the host. According to the theoretical considerations previously outlined, the improbability that the blood group of donor and host can be of particular significance is evident. Blood groups probably depend upon a few genes and tend to throw all individuals into four groups while the individuality or organismal differential most likely is determined by all or at least a great number of genes of an individual. Thus the theory of organismal differentials multiplies the possibilities of strangeness to an infinite number.

SKIN GRAFTING AFTER PARABIOSIS

Of interest in passing is the unique experiment of uniting two animals of the same species by a surgical operation. This was performed by Bert[13] and Sauerbruch and Heyde.[14] But parabiosis seems not to improve the chances of transplantation of skin. The innate virility of one or the other of the animals eventually overcomes the less virile animal and its vitality is sapped progressively until death. Even at a time when both are in good health, skin transplanted from one partner to the other does not grow so well as previously and, surprising as it may seem, even transplantation of skin from one part of the animal's body to another part (autotransplantation) shows a decrease in the tendency to thrive.

CONCLUSIONS

(1) Autotransplantation of skin usually does succeed.

(2) Syngenesiotransplantation of skin is theoretically improbable except in identical twins where it is theoretically probable and clinically has occurred.

(3) The experimental grafts in man herein tabulated, the experimental work performed upon animals, and theoretical reasoning argue against the blood group of the individual as playing a role of any essential significance in the homotransplantation of skin.

(4) Finally, the bulk of experimental and clinical experience is in agreement that for all practical purposes homotransplantation of skin may be relegated to the realms of medical mythology.

BIBLIOGRAPHY

1. Holman, E.: Protein Sensitization in Iso-Skin Grafting. Surg., Gyn. & Obst., 38:100-106, 1924.
2. Quoted by Loeb, Leo: Transplantation and Individuality. Physiol. Rev., 10:547, 1930.
3. Loeb, Leo: Transplantations and Individuality. Physiol. Rev., 10:547, 1930.
4. Lexer, E.: Die Freien Transplantatimen, 2nd Vol. Die Neue Deutche Chirurgie.
5. Freeman, L.: Skin Grafting. C. V. Mosby Co., 1912, p. 8.
6. Perthes, G.: Is Homoplastic Skin Grafting Between Brother and Sister Comparable to Autografting? Zentralbl. f. Chir., 44:426, 1917.
7. Blair, V. P.; and Brown, J. B.: The Use and Uses of Large Split Skin Grafts of Intermediate Thickness. Surg., Gyn. & Obst., 49:82-97, 1929.
8. Davis: Ann. Surg., 50:542, 1909.
9. Masson, J. C.: Skin Grafting. J.A.M.A., 70:1581, 1918.
10. Shawan, H. K.: Principle of Blood Grouping Applied to Skin Grafting. Amer. Jour. Med. Sci., 157:503, 1919.
11. Correus, C.: Individuen u. Individual stoffe. Naturwissen, Schaften, 4:193-210, 1910.
    Selbst sterilitat u. Individual stoffe. Biol. Centsalblatt, 33: 389, 1913.
12. Davis, J. S.: Some Problems of Plastic Surgery. Ann. Surg., 66:89, 1917.
13. Bert, quoted by Loeb, Leo: Physiological Reviews, 10:547-616, 1930.
14. Sauerbruch, F.; and Heyde, M.: Weitere Mitteilungen uber d. Parabiose l. Warm blutern mit Versuchen uber Ileus u. Uraemie Zeitschr. f. exper. Pathol. u. Therap., 6:33, 1909.

DISCUSSION (*Abstract*)

Dr. Ernest W. Goodpasture, Nashville, Tenn.—In the disease fowl-pox the infective agent grows within the cells of the epithelium of the skin; and the disease, when it is not fatal, causes an immunity. It occurred to me that we might study whether this is a tissue immunity or humoral immunity by transplanting the skin from an immune chicken to a non-immune, and then inoculating the graft to see if the infection would take place. We have made a great many attempts to transfer the skin of one chicken to another without success. We have never succeeded, as a matter of fact. However, in the literature it seems to be possible to transplant the skin of a chick to another chick one or two days of age, and the grafts seem to remain into adult life after transplanting. For example, it has been possible to transplant a piece of skin that has black feathers onto an area bearing white feathers of another chick, and the black will grow out on the white. But we have not been able to transplant skin from one chicken to another after they are several weeks old, as would be necessary in our problem.

I should like to ask Dr. Padgett if there is any indication in the literature, or in his experiments, that isotransplants might have a better possibility of success in infants than in adults, because that seems to be the case with chickens.

Dr. Padgett (closing).—Half of one issue of *Physiological Reviews* for 1930 is devoted to the discussion and a review of the literature of the experimental work on transplantation of tissue, by Leo Loeb. Loeb discusses some very fundamental questions. When one is dealing with adult individuals, and after all a child is in a certain sense an adult individual, it makes no difference whether he is old or young. Embryonic tissue, however, acts differently and apparently homotransplantation is possible. Embryonic cells can be transplanted before they hatch from the egg. As soon as the chick hatches from the egg, it seems to be impossible.

Dr. Goodpasture.—Your conclusion is that homotransplantation is impossible?

Dr. Padgett.—Yes. I think we are dealing with a fundamental biological principle that as yet makes permanent "takes" practically impossible except possibly in very closely inbred animals or in identical twins which come from the same placenta. As to the latter, it is theoretically possible, and we are now watching our four transplants in identical twins with much interest. There is evidence that it is possible to get transplants of embryonic cells to live permanently.

THE ROLE OF FATIGUE IN DIGESTIVE DISORDERS*

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They who received their training in the physico-chemical era of medicine were taught, at least by implication, that most ailments, and in the not very distant future all ailments, would yield their secrets to microscopy, roentgenology or other appropriate chemical or physical procedures then in use or shortly to be discovered. They felt that if the various tests, chemical, serological, bacteriological, to which a patient's tissues, secretions and excretions might be subjected, revealed no departure from the average, the ailment of which such a patient complained was in all probability the figment of a disordered imagination. That to continue such a patient under treatment was to invite the criticism of orthodox medicine or at least that it represented an invasion of the province of psychiatry and that any success that might attend their efforts in such cases was attributable to coincidence. The foregoing is a deliberate overstatement of the situation but the essence of truth will be recognized.

The mechanistic conception of life and disease has discharged and is still discharging its indispensable function of reducing constantly the unclassified residuum of bodily ailments. No one wishes to abandon any of the territory so painfully wrested from the unknown. There is detectable, however, on the part of medical writers and inferentially on the part of practising physicians a growing disposition to erect upon the foundations of careful clinical and laboratory medicine a better appreciation of purely functional disorders, a disposition to modify that strictly materialistic attitude to which their training in a measure had committed them. It is realized more and more that there is no boundary line between physiology and psychology nor

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between clinical medicine and psychiatry. They are interdependent, interdigitated and reciprocal. Every alteration of our physical structure or position has its counterpart in the consciousness and every thought, emotion or mood is represented by somatic and visceral adjustments.

Conspicuous among the causes of those bodily disorders which have no demonstrable pathology is fatigue. For many years physiologists have taxed their ingenuity to discover the exact point in the neuro-muscular mechanism at which fatigue first occurs, hoping, it is presumed, that upon discovering the most vulnerable structure in the system a method of reinforcing it would suggest itself which when applied would defer the onset of fatigue until some other ascertainable structure, second in fatigueability, should break down, whereupon this second structure could be artificially strengthened and so on, thus deferring fatigue indefinitely.

The question that arises first is whether fatigue ensues as the result of the depletion of available stores of glycogen or other combustible material in the muscles. Under laboratory conditions a dog might conceivably be exercised until glycogen disappears completely from the muscles provided he had been starved and phloridinized beforehand. But in nature such a situation never occurs. It most certainly never occurs in the course of civilized occupations particularly among our patients who complain most bitterly of feeling tired. The attempt was made many years ago[1] to circumvent fatigue by the frequent administration of sugar during work. The results while encouraging under test conditions were not striking enough in practice to warrant extensive adoption of the method. More recently[2] phosphoric acid has been invoked for the purpose because of its participation normally in the reconstruction of combustible material from lactic acid. During the war certain German troops were given daily doses of primary sodium phosphate and it was claimed that such troops were recognized readily by their fresh appearance compared to control troops after long marches and that the difference was especially marked as regards morale. The occasional laxative effect of this substance in the dosage required to alleviate fatigue has proven a deterrent to its widespread use.

The accumulation of the waste products of metabolic activity has been advanced as a cause of fatigue. Such an accumulation might conceivably cause a decrease in the responsiveness of muscles to stimulation and much work has been done to determine the nature of such substances. Lactic acid and carbon dioxide have most continuously held the center of the stage but it is generally conceded that in the presence of an adequate circulatory system fatigue from this cause never occurs. Mention may be made also of the reputed isolation from fatigued muscles of a specific fatigue toxin[3] which, when injected in minute quantity into the body gave rise to sensations of fatigue. To indicate the lengths to which speculation can go it was seriously attempted to produce by the usual serological methods a specific fatigue antitoxin for general use. The absence of such a serum from our pharmacopeia today is mute evidence of the degree of success which attended this effort.

Turning from the purely chemical questions involved in the metabolism of muscular activity to the nerve structures that participate therein, we find that studies of the fatigue of the reflex arc have yielded important results. In so far as is technically possible each of the structures of the reflex arc has been subjected independently to study for evidences of fatigue resulting from continued stimulation.

Nerve fibres are the most resistant to fatigue of all parts of the system. It is found that if the nerve impulse is blocked at the myoneural junction by curare, a nerve trunk may be stimulated by induction shocks continuously for four to five hours without complete fatigue, since, as the curare effect wears off the muscle whose contractions are being recorded begins to respond,[4] thus showing that the nerve continued to carry impulses after such prolonged and continuous activity.

That the sensory receptors can be intentionally fatigued has been demonstrated repeatedly. A continued stimulus whether it be tactile, thermal, auditory, visual, gustatory or olfactory soon fails to be perceived, but such fatigue "wears off" rapidly on withdrawing the exciting stimulus after which the characteristic effect can again be produced in its original intensity by the same stimulus.

The cell body of the neurone shows definite alteration in staining characteristics as a result of severe muscular fatigue[5], and it may be a valid inference that such alterations indicate a temporary inhibition of function of the particular cells so affected.

As to the synapse it is quite impossible to determine by direct observation the changes that occur in this "potential space" between the axone of one cell and the dendrites of another. However the effect of tonic doses of strychnine in relieving the sensation of fatigue, together with

the fact that strychnine lowers the synaptic resistance[6], gives a clue and leads irresistibly to the belief that here at the synapse is found the vulnerable point of the neuro-muscular system, the point at which fatigue characteristically first occurs.

This being true, we are obliged to conclude that fatigue is a generalized feeling of disinclination to activity caused by a localized or circumscribed synaptic resistance. Thus fatigue may be due to the continued activity of a spinal reflex, the continued activity of one of the more elaborate reflexes known as behaviour patterns which are followed by emotions, or to the continued activity of neurones located in the higher perceptive, cognitive, or volitional centers. In either case the result in so far as sensation goes is the same: a feeling of languor and an aversion for work. That similar physiological responses may accrue from dissimilar causes is a familiar observation. Thus chattering teeth and trembling limbs may be symptoms of either fright or cold, and weeping may result from sorrow or joy. Therefore it is not unreasonable to assume that the bodily changes accompanying fatigue are similar whether the fatigue be due to the long continued use of a group of muscles or to long continued preoccupation with a single idea. In other words the somatic and visceral changes accompanying fatigue are independent of the type or location of the synapses affected.

These changes are adjustments which are highly necessary if it become imperative that activity continue or be initiated. They consist in general of abolishing all functions that are not concerned, directly or indirectly, in the movement of the limbs or in transporting the body from place to place.[7] The intellectual functions are inhibited, the sex functions are held in abeyance, the secretion of saliva, gastric and intestinal juice, pancreatic juice, and bile stops and the motility of the stomach and intestines is abolished.

The significance of this sequence of events for both patient and gastroenterologist becomes apparent when it is recalled that it is just at this particular time that the tired individual eats his evening meal, the largest meal of the day. If such a meal were digested properly under these conditions many of our principles of physiology would be discredited.

As a further and secondary effect of fatigue due directly to the abolition of intellectual control we see the "unbridled" emotional display resulting from trivial causes. The giggling of jaded children, the peevish irritability and impatience of the worn-out business man, the apprehensiveness, suspiciousness or uncontrollable weeping of the perennially tired house wife may serve as examples. Such emotional manifestations are fully capable of inaugurating those profound bodily changes which have been shown to occur in fear and rage. Thus, the functions of the digestive tract are further and further impaired.

The association of fatigue and digestive disorders is observed frequently enough to indicate a casual relationship. Such fatigue is described as weariness, tiredness, sluggishness, or heaviness, and characteristically occcurs in persons who admit freely that the demands made upon them should not have this effect. Physician and patient are tempted to attribute this weariness to the absorption from the digestive tract of hypothetical and undescribed toxic products of incomplete digestion. It is more rational to attribute the faulty digestion to an underlying fatigue of psychogenic origin.

To suggest a remedy for the fatigue of the under-worked is a task I have not considered within the scope of this paper. We have noted above the futility of the various methods that have been used in the past. That the remedy does not consist of more rest is self-evident. Change of scene, varying one's occupation and diversification of interests, all suggest themselves and all are in most cases impossible of enactment.

The most generally applicable and effective method of ameliorating fatigue in such cases is to induce such a tired individual to allow himself to be actuated in the performance of his daily tasks from hour to hour by a number of different, appropriate, consciously aroused, dynamogenic motives. In this manner an almost infinite number and variety of synaptic connections must be utilized and no circumscribed area will reach that degree of resistance that induces the feeling of fatigue.

REFERENCES

1. Schumburg: Zeitsch. f. diatet. Therap. 1899.
2. Embden, Grafe and Schmitz: Zeit. fur Physiol. Chemie, 113:67, 1921.
3. Weichert: Munch. med. Wochsch. 1904.
4. Bowditch: Jour. of Physiol, 6:133, 1885.
5. Crile: The Origin and Nature of the Emotions, 1915.
6. Macleod: Physiology and Biochem. in Modern Medicine, St. Louis, p. 845, 1920.
7. Cannon: Bodily Changes in Pain, Hunger, Fear and Rage, New York, 1915.

ROENTGEN RAY STUDY OF THE MAMMARY GLAND*

By IRA H. LOCKWOOD, M.D.,
Kansas City, Mo.

The resources now available against lesions of the mammary gland require the cooperation of the patient and they are efficient in proportion to the discoverability of the lesion, its location, stage of advancement, and the equipment, skill and ability which are available to diagnose and treat the case. Following the work of Warren in his "A Roentgenological Study of the Breast,"[1] we feel that a definite step has been made toward their recognition, but we should recognize that the microscopic examination of excised tissue is essential for correct diagnosis and treatment.

The benign and malignant tumors in this series diagnosed by roentgen ray have been proven by microscopical sections. In the cases which were not operated upon in which there was the clinical suspicion of malignancy but which had normal roentgen findings, there has been a sufficient lapse of time to disprove the presence of cancer. In none of these cases have we seen the individual before the interpretation of the roentgenogram or had access to the clinical history, except the age, marital state, number and date of pregnancies.

Fig. 1
Normal breasts.

*Read in Section on Radiology, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

In the examination of a patient with malignancy of the breast, certain facts must be observed. Is the lesion clearly localized? By a localized lesion we mean a growth that is still small and under no circumstances has invaded the surrounding tissues. If there is any doubt about localization, then the lesion may have already invaded the chest wall, the pectoralis muscles or the skin. Or the breast may have become fixed and possibly the axillary or supraclavicular lymph nodes have become involved.[2] The roentgen examination will allow the early recognition of carcinoma, differentiate it from other lesions, definitely define its extension and outline its invasion of the surrounding struc-

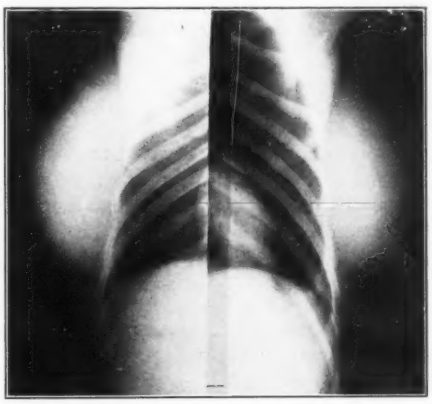


Fig. 2
Lactating breasts.

Fig. 3
Adenofriboma of the left breast.

Fig. 4
Papillary adenoma carcinoma.

tures, thus enabling a more nearly perfect eradication by surgical methods, giving the patient a better and more permanent chance for complete cure and preventing many useless and mutilating operations.

In the normal breast the fully formed mammary gland is made up of from ten to twenty lobes, representing as many racemose glands, each pyramidal in shape, with ducts converging toward the nipple. The lobes coalesce to form a larger pyramid with its apex at the nipple and the base at the chest wall. The linear striations shown on the roentgenogram are due to the fibrous tissue surrounding the ducts. Any change in the outline of this pyramid or irregularity in the linear striations is suggestive of a lesion. The gland lies within the superficial fascia, which divides into two layers for its reception. Beneath the gland is found a varying amount of fat which in some cases makes up a great part of the entire prominence of the breast. In the negatives of the normal breast all of these structures are shown. The nipple stands out from the areola, the fibrous tissue surrounding the ducts is clearly outlined, the base of the breast is easily distinguished from the pectoralis muscle, the gland structure is sharply differentiated from the fatty tissue and the muscle planes are smooth and regular. The normal mammary gland is always active. The roentgenogram shows certain changes taking place in the density of the pyramid before, during and after menstruation. Midway between the menstrual periods the linear striations become more distinct due to changes in the epithelial cells with hyperplasia producing an increased density of a homogeneous character; and shortly after menstruation there is a beginning retrogression and the gland gradually returns to normal.

The breast with abnormal findings at the menstrual period shows changes that are only gradations from the normal. At the beginning of the menstrual cycle the glandular structures are engorged and the whole breast takes on a homogeneous appearance, to undergo a stage of retrogression following the menstrual period; but it never returns to a perfectly normal appearance and we are of the opinion that these changes in the breast structures are permanent and are indications of incipient disease.

In chronic mastitis several forms of chronic inflammation of the breast have been described under many different names. The condition noted by certain writers corresponds so closely to the atrophic changes incident to old age as to suggest the possibility that in some cases senile conditions may have been interpreted as pathological. Certainly, however, there are cases of chronic interstitial inflammation, which eventually develop pathological conditions due to hyperplasia with contraction of the fibrous tissue. It is often difficult to distinguish between the normal, the early changes due to inflammation and beginning senile fibroid transformation. In chronic mastitis, the fibrous tissue surrounds the fat of the breast, while a benign tumor pushes aside the fat and other constitu-

Fig. 5
Cystic areas with dense sclerotic fibrous tissue capsule with papillomata projecting into lumen of cyst.

Fig. 6
Inflammatory carcinoma of both breasts, more extensive on the right side.

ents. Most cases of chronic interstitial mastitis occur at about the time of the menopause. It is surprising how widespread the condition has been and in our series it has occurred from puberty to menopause.

The breast in pregnancy and lactation begins to increase in size about the fifth or sixth month of pregnancy, and enlargement of the fatty masses and the glandular structures is shown. At the time of labor the breast presents a dense, congested, hazy appearance and the fibrous tissue structures are lost. Shortly after labor these begin to return, but the breast retains its hazy appearance during the period of lactation.

Benign tumors of the breast are made up in a general way of tissues which more or less closely resemble the normal. They are, as a rule, definitely circumscribed and sharply outlined. The density is homogeneous, but the connective tissue stroma is shown through this opacity. The benign tumor pushes aside the fatty tissue and other constituents of the breast. There is a distinct continuity of the capsule and absence of deformity. The fibroadenoma originates from both the glandular and connective tissue. The arrangement of the elements may, however, show wide variations in different portions of the same tumor.

Any breast tumor may be the seat of cystic transformation incidental to the growth of a neoplasm. The serious import in these cases lies, not in the cyst, but in the character of the tumor. The cyst may become so large as to obscure the tumor itself or a papillary growth may develop and so fill the cavity and simulate a solid tumor. The differentiation between these cysts and cavities originating in the breaking down of the solid growths may be extremely difficult. Cysts may occur in any part of the breast. Usually there is no retraction of the nipple or dimpling of the skin, and the cyst may be of any size. The cystic mass is more dense and displaces the remaining normal breast tissue, but it is less dense than a solid tumor.

Malignant tumors of the breast infiltrate and destroy the neighboring tissue. They are without definite demarcation and characterized by proliferation. In the more advanced cases a band extends from the nipple to the tumor mass. There is an irregularity of the pyramid, a loss of the normal linear striations and feathery strands of dense fibrous tissue involve the ducts and lobules with extension along the lymphatics, enlargement of the lymph nodes, and loss of the normal muscle planes.

Inflammatory carcinoma[3] of the breast presents such unusual manifestations that the clinician is often misled. It has been described by many writers with such variations as to suggest that uncertainty exists as to the nature of this lesion. The rate of growth is rapid and the tumor may involve the entire breast and be

Fig. 7
Inflammatory carcinoma of the right breast.

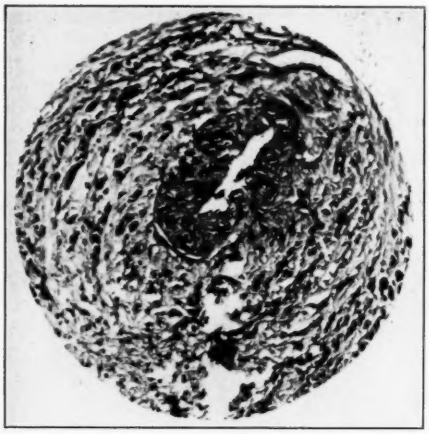


Fig. 8
Carcinoma cells about medium size blood vessels.

fatal in a few weeks' time. Fortunately the condition is rare. Age, trauma or previous lactation apparently does not enter into the etiology. The differential diagnosis must be made from abscess of the breast, erysipelas, radiation changes, tuberculosis, ulcerating carcinoma of the breast, Paget's disease and gumma. The roentgen examination in inflammatory carcinoma of the breast shows a homogeneous opacity over the area involved and only by increasing penetration are we able to show the breast structures with the increased fibrous tissue change, the definite tumor mass and marked thickening and infiltration of the skin with the underlying structures adherent to it.

SUMMARY

A method of study of the breast has been discussed which, we believe, will, in a large majority of cases, definitely determine whether a tumor mass be present, differentiate benign from malignant lesions, define the extension, invasion and involvement of the surrounding structures, and will be an aid in bringing lesions of the breast to the surgeon at an earlier stage of their development. It will also be a factor in determining whether the individual case with carcinoma of the breast can possibly be benefited by an operative procedure.

Our series comprises the study of 312 cases with 69 operated upon. Mistaken interpretation in the cases operated upon has been made in two instances: a cyst was called a malignancy and a benign intracystic papilloma was interpreted as a malignant cystic degeneration.

REFERENCES

1. Warren, Stafford L.: A Roentgenologic Study of the Breast. Amer. Jour. Roentgenol., 24:113-124, Aug., 1930.
2. Lockwood, Ira H.: Radiation in Carcinoma of the Breast. Jour. Ark. Med. Soc., 28:51-55, Aug., 1931.
3. Lee, Burton J.; and Tannenbaum, Norman E.: Inflammatory Carcinoma of the Breast. Surg., Gyn. & Obst., 39: 580-595, Nov., 1924.

DISCUSSION (*Abstract*)

Dr. J. C. Dickinson, Tampa, Fla.—This is pioneer work and offers remarkable possibilities for good. We have many times been able to save patients from mutilating operations by demonstrating metastasis in what had been considered operable breast lesions.

We should, however, be conservative. Dr. Lockwood, in preparing this work, reports 312 cases as the basis of his paper. I learn that he examined about 200 normal cases, or cases in which breast disease was not suspected before he attempted to differentiate the pathological cases. If we are all willing to do the same amount of work, we shall have a foundation on which to give an opinion in lesions of the breast that will be of value to the consulting physician. The basis of the work is in definite fundamental pathological appearances that can be demonstrated on properly made roentgenograms. If we can learn to interpret these changes from the normal, we shall be able to be of real help in this particular field of work. On the other hand, if we merely try to compare our pictures with pictures that may be published with Dr. Lockwood's paper, we shall be in for real trouble, the method will be discredited and more harm done than good.

Dr. D. A. Rhinehart, Little Rock, Ark.—Dr. Lockwood has pointed out a new field for the use of the x-ray. That we may use this to advantage, we must learn to do this work. The technic of making the x-ray exposures looks rather simple, but is not. Next we must study the appearance of the normal breast. After we have a fair idea of the normal, we should approach the pathological carefully and circumspectly. I have had some experience in making these determinations, but I am not entirely sure of results at this time and probably shall not be for some time to come.

Dr. Lockwood has described a new method for examining the human breast that will approach in accuracy the x-ray examination of the stomach for benign and malignant lesions.

One thing that has impressed me more than anything else was a statement which Dr. Lockwood did not include in his paper this morning: that during the routine examination of a large number of women a certain number of unsuspected and clinically undemonstrable malignant lesions were found by him.

Dr. C. C. Phillips, Charlotte, N. C.—I shou'd like Dr. Lockwood, in closing, to tell us or show us on a subject in what position he places the patient to get the shadows of the breast which he has shown us.

Dr. K. F. Kesmodel, Birmingham, Ala.—I should like to ask what technic was used, with particular reference to the change of voltage according to the degree of density or thickness of the breast.

Dr. Lockwood (closing).—Regarding the radiographic technic, we always use the Potter Bucky diaphragm with the following factors: 30 ma., 30 in. distance, 50 kv. and from 3 to 6 seconds' time. The patient is placed in an oblique position with the arm at right angles to the body; this prevents any distortion of the breast. The focal spot is an imaginary line drawn through the thorax from the anterior attachment of the breast to the posterior attachment.

Negatives of both breasts should always be made for comparison. As a rule we do not make stereoscopic negatives. In some cases it will be of benefit, as Warren has suggested.

I believe that we can show on the negative the anatomical structures of the breast, and if that is true we should be able to determine the pathological condition, differentiate benign from malignant lesions, define the extension and degree of invasion, and this will bring the patient to surgery at an earlier date.

LEAD POISONING: THE BONE CHANGES ROENTGENOLOGICALLY CONSIDERED*

By ROBERT DRANE, M.D.,
Savannah, Ga.

In 1874, Wegner showed that the small doses of inorganic phosphorus given for rickets caused an increase in the number of trabeculae in the ends of the rapidly growing long bones. He called this process "osteosclerosis." In 1918, Phemister showed that these areas of "osteosclerosis" were recorded in roentgenograms as bands of increased density. They occur just proximal to the epiphysis and broaden with growth as long as the phosphorus is consumed. Vogt, of Boston, and Park, of Baltimore, were the first to recognize a similar zone as part of lead poisoning, and to rely upon it as a diagnostic sign. Park also demonstrated that there is the same increase in the bony trabeculations in lead as there is in phosphorus.

The cause of this area of increased density is twofold: as has been stated, there is an increase in the trabeculations just proximal to the epiphysis. However, the more important cause is the replacement of calcium in the bone by lead. Aub and his co-workers have shown that a known solution of lead can be passed over crushed bone until all the lead has been absorbed. Examination of the filtrate shows calcium present in proportion to the lead lost. The degree of absorption depends upon the hydrogen-ion concentration. It is logical to presume that the same process takes place in the living bone.

The history of this band is interesting. The source of the lead is most often paint from toys or furniture. It is the nature of normal young children to gnaw things. Some have a perverted appetite. Whether all cases of lead poisoning in the young show the dense zones we do not know. It has constantly been present in those cases which have been diagnosed by other methods. It does not appear after the epiphyses have closed. The ends of the long bones and the ribs are the most favorable sites, for it is here that growth is fastest. The younger the child the earlier the sign is detected, for the lead is concentrated in a smaller area. Thus we may diagnose in a young child a degree of lead poisoning which would be overlooked in an older one. The density of the band depends upon the concentration of lead, and upon the source of supply, whether it be constant or intermittent. If constant, the band is homogeneous; if intermittent, it may consist of lighter and darker bands. If the source of lead is re-

Fig. 1
Showing dense lead line at the epiphyses.

*Read in Section on Radiology, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

Fig. 2

Same patient as Fig. 1 three and a half months later, showing the lines broader and less dense. An effort was made to watch this patient, but during this interval she occasionally ate paint.

moved, the band is incorporated in the shaft as new bone is formed at the epiphysis. It becomes less and less dense, for the lead is absorbed by the blood and eliminated by the kidneys and colon. However, some of that lead which has been absorbed and is present in the blood may be redeposited as a fainter band. The fact that the bands disappear proves that the shadow is caused more by the presence of lead in the bones than by the increased trabeculations.

The same condition is also caused by ingested and deposited phosphorus, strontium, bismuth, and calcium. That band seen in rapidly healing rickets, though often of the same density, is easily differentiated by other concurrent changes of rickets. A narrow band occurs when growth is retarded in certain severe constitutional or nutritional diseases. Very broad and dense areas are seen in marble bones. In this condition the epiphysis is also involved.

To summarize: we have in this band of increased density, best seen proximal to the epiphyses of rapidly growing bones, an easily demonstrated sign. Though not pathognomonic, it is of definite diagnostic value. The underlying cause is easily determined by the history and clinical tests.

I wish to acknowledge with thanks the kindness of Drs. Park, Vogt, Zillmer, Pirie, and Gleaton.

REFERENCES

7. Wegner, G.: Uber das normale und pathologische Wachstum der Roehrenknochen. Virchow's Arch. f. path. Anat., 61:44, 1874; Der Einfluss des Phosphors auf den Organismus. Ibid., 55:11, 1872.
2. Phemister, D. B.: The Effect of Phosphorus on Growing, Normal and Diseased Bones. J.A.M.A., 70:1737, June 8, 1918.
3. Vogt, E. C.: A Roentgen Sign of Plumbism. Amer. Jour. Roent. & Rad. Ther., 24:550, Nov., 1930.
4. Vogt, E. C.: Roentgenological Diagnosis of Lead Poisoning in Infants and Children. To be published in J.A.M.A.
5. Park, E. A.; Jackson, E.; and Kajdi, L.: Shadows Produced by Lead in the X-Ray Pictures of the Growing Skeleton. Amer. Jour. Dis. Child., 41:485, March, 1931.
6. Aub, J. C.; Fairhall, L. T.; Minot, A. C.; and Reznikoff, P.: Lead Poisoning, Medicine Monographs, vol. 7. Baltimore: Williams & Wilkins Co., 1925.
7. Pirie, A. M.: The Development of Marble Bones. Amer. Jour. Roent. & Rad. Ther., 24:147, Aug., 1930.
8. Current Comment: Lead in the Growing Skeleton. J.A.M.A., 96: No. 23, 1931.

DISCUSSION (*Abstract*)

Dr. Eugene P. Pendergrass, Philadelphia, Penn.—During the past few years there seems to be an ever increasing number of zones of increased density occurring at the ends of growing bones with which it behooves the radiologist to become conversant and familiar. These are as follows:

(1) The zone of temporary calcification which is normal.

(2) The zones of increased density occurring in healing rickets.

(3) The zones of increased density occurring in scurvy.

(4) The zone of increased density occurring in children receiving small doses of phosphorus.

(5) The zone of increased density occurring after the prolonged administration of viosterol and in congenital and secondary anemias, miliary tuberculosis, celiac disease, malnutrition, and chronic infections.

(6) The zone of increased density occurring in lead poisoning.

(7) The zone of increased density occurring in that obscure condition, marble bones, Alber's Schonberg's disease.

These zones are all similar, but can be differentiated one from another if one studies the roentgenograms carefully and takes into consideration the age and history of the individual.

(1) The normal zone of temporary calcification is a narrow zone of increased density located at the most distal portion of the diaphysis of an actively growing bone adjacent to the diaphyso-epiphyseal junction. It is approximately 0.5 mm. in width.

(2) The zones of increased density occurring in heal-

ing rickets are wider than normal, usually 2 to 4 mm. in width and always distal to a zone of decreased density (osteoid zone). Calcium and lead are both radiopaque and it may become most difficult to differentiate the two conditions, since the calcium in healing rickets and the lead in lead poisoning are deposited in relatively the same position.

(3) The zones of increased density in scurvy are wider than normal, but not so wide as in lead poisoning. This factor, together with the other signs of scurvy, such as Wimberger's ring, the lateral spur formation and the zone of decreased density proximal to the zone of increased density renders it possible easily to differentiate scurvy from other conditions causing similar bone changes.

(4) The zones of increased density occurring in children receiving small doses of phosphorus cause a peculiar density at the end of the diaphysis and also the osseous centers. This was first described by Phemister and is similar to the appearance found in marble bones.

(5) The zone of increased density seen in congenital lues is quite irregular due to irregular deposition of calcium. It has been referred to as saw-toothed. This alone would differentiate it from lead poisoning. There are a group of congenital luetics who, when receiving any specific therapy, lose the saw-toothed appearance in the zone of increased density, and in addition the zone of decreased density becomes widened and may definitely simulate lead poisoning roentgenographically. The history would of course differentiate the two conditions.

(6) In acquired secondary and congenital anemias, chronic infections, and after prolonged administration of viosterol and other conditions mentioned above under (5) the temporary zone of calcification assumes proportions that make it extremely difficult to differentiate one from another.

In regard to lead poisoning, there are a number of features that need further study, but from present knowledge as reported by Aub, Vogt, Park and Caffey, one is justified in the assumption that the bone changes occur only in the actively growing bone, and no changes are to be expected in the adult. Furthermore, the changes in the long bones seem to be fairly constant, in the reported cases, although Park raises the question whether in some cases the band of increased density may be absent.

It should be remembered also that there is still some question whether the zone of increased density is due entirely to deposition of lead or increased number and width of the bone trabeculae or both.

I would like to emphasize again some of the points brought out by Dr. Drane in this affection

Park and Caffey have shown that the anatomical changes (increased number of bony trabeculae) at the ends of the diaphyses appear to be a major factor in the production of the bands of increased density.

Aub has shown that lead storage occurs only in solid portions of the cancellous bones.

Vogt found that more lead was deposited in the actively growing portion than in the cortex. Therefore the lead storage in the ends of the bones may be due to the increase in number of bony trabeculae.

Multiple transverse bands of increased density occur in lead poisoning developing as the child grows. The bands may be narrow or broad, depending upon the length of dosage of lead.

Formerly roentgenologists too frequently have referred to multiple transverse bands of increased density as evidence of delayed bone development sometime in the past.

From the above remarks, therefore, it is readily appreciated that there are a number of conditions that will affect and disturb normal ossification in the actively growing bone in the region of the zone of temporary calcification. It also serves to emphasize for us as radiologists the necessity for correlation of the clinical and roentgenological findings before rendering a diagnosis.

Dr. Leon J. Menville, New Orleans, La.—Dr. Caffey, of the Baby Hospital, in New York, presented experimental work on this subject, which was published recently in *Radiology*. The changes in the bones due to lead poisoning in children may be confused in certain instances with those of rickets. Being familiar with rachitic bone changes observed in experimental work wherein we used several hundred rachitic rats, I can appreciate the fact that at times unless we are careful in our interpretation we may confuse rickets and lead poisoning.

POSITIVE PRESSURE IN ARTHRODESIS FOR TUBERCULOSIS OF THE KNEE JOINT*

By J. Albert Key, M.D.,
St. Louis, Mo.

In this paper a method for arthrodesis of the knee is described in which the two bones are pressed together over a period of several weeks after the excision of the joint. The pressure is maintained by means of turnbuckles connecting pins passed transversely through the lower third of the femur and the upper third of the tibia.

I shall not discuss the question as to whether or not arthrodesis is advisable in tuberculosis of the knee because it is my opinion that tuberculosis of any large joint is most safely and effectively treated by arthrodesis of the involved joint. In other words, when a large joint is involved, the most conservative treatment of surgical tuberculosis is surgery.

However, if the surgical treatment is to be successful, bony union should be obtained and, as is well known among orthopedic surgeons, it is often very difficult to obtain bony union in a tuberculous joint. This is not explained by the fact that we are dealing with atrophic can-

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

*From the Shriners' Hospital for Crippled Children and the Washington University Medical School, St. Louis, Missouri.

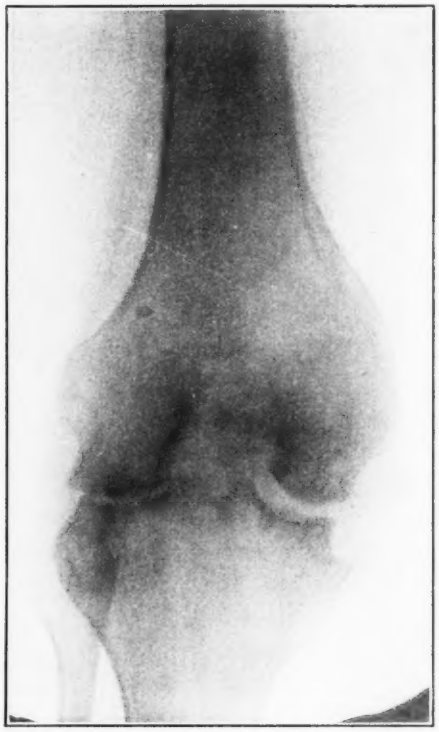


Fig. 1
Moderately advanced tuberculosis of the knee in a girl seventeen years of age. Case 1.

cellous bone, because I believe that atrophic bone unites more readily than does normal bone and cancellous bone unites more readily than does compact bone. Nor does the fact that we are trying to unite the articular ends of bones explain our failures because in the usual arthrodesing operation the synovial membrane is excised and the joint cavity is obliterated. This is particularly true in arthrodesis of the knee with which this paper deals.

Every surgeon who has arthrodesed many knees for tuberculosis has noted that in a certain percentage of his cases primary union by bone does not occur and the wound either breaks down or a fibrous union is secured. After a period of several months this fibrous union may consolidate and bony ankylosis is eventually obtained.

This failure to obtain bony ankylosis is often attributed to some as yet unknown factor peculiar to bone which is involved in a tuberculous process. The operation to be described does not attempt to combat any unknown factor in the physiology of tuberculous bone. It is based upon the belief that other things being equal, two bones will most readily unite if they are placed in contact and absolutely immobilized until union by bone has occurred.

In most of the modern arthrodesing operations on the knee, relative immobilization is obtained by a plaster cast and in many cases this immobilization is rendered more complete by nailing the bones together or by bone grafts or plates. All of these methods are relatively inefficient in the knee. However, if two broad surfaces of cancellous bone be continually pressed together and the limb supported in a plaster cast, the immobilization will be practically absolute. Whether or not the positive pressure also stimulates osteogenesis and union between the bones I do not know. I have attempted to answer this question in the experimental laboratory, but as yet the results are inconclusive.

At the knee it is a relatively simple procedure to place a heavy stainless steel pin through the

Fig. 2
Same as preceding, lateral view.

lower portion of the femur and another through the upper portion of the tibia and to pull these pins together by means of two turnbuckles and exert positive pressure on the excised ends of these bones.

Technic of the Operation.—The skin having been subjected to a forty-eight hour preparation, the limb is elevated for a few minutes and a tourniquet is applied and the leg is draped leaving an area of about eight inches exposed both above and below the knee. Excision of the knee is performed according to the taste of the surgeon. I use the inverted U incision, perform a complete excision of the synovial membrane, semilunar cartilages and ligaments and cut off the condyles of the femur and of the tibia and the articular surface of the patella with a saw. With a chisel I then remove whatever articular cartilage may be left. The femur is fitted to the tibia and the saw cuts are so made that the desired position of the leg on the thigh is maintained when the end of the two bones are pressed together.

A heavy stainless steel pin made of drill rod (three sixteenths of an inch for adults and five thirty-seconds of an inch for children) is drilled through the lower end of the femur a short distance above the upper ends of the incision and a similar pin is inserted through the upper third of the tibia, the pins being approximately parallel and of such a distance apart that with the bones in contact the extended turnbuckles will fit over the ends of the pins. Care is taken to pull the skin upward on the thigh and downward on the leg when the stab wounds for the pins are made, and when the pins are inserted, in order that when they are pulled together pressure will not be made upon the skin. An ordinary turnbuckle of the appropriate length is placed on either side and over the projecting ends of the pins and the bone ends are manipulated into the desired position and the turnbuckles are tightened slightly, but not sufficiently to bend the pins, merely enough to hold the ends of the bones firmly in contact. The knee is then closed without drainage with interrupted sutures using chromic catgut for the capsule and plain catgut for the subcutaneous tissues and skin. As a rule it will be found that the flap of the incision is longer than necessary and the lower half inch or so should be excised in order to make a neater closure. This brings the patella down across the joint and in contact with the upper end of the tibia from which the periosteum and a thin flap of bone have been raised. The wound is dressed and a snug plaster of Paris cast is applied from the groin to the toes.

The limb should be supported with a pad or small sand bag under the knee after the turnbuckles are tightened, and handled with care during the application of the cast because if the leg is hyperextended or permitted to drop and flex the knee the leverage is so great that the

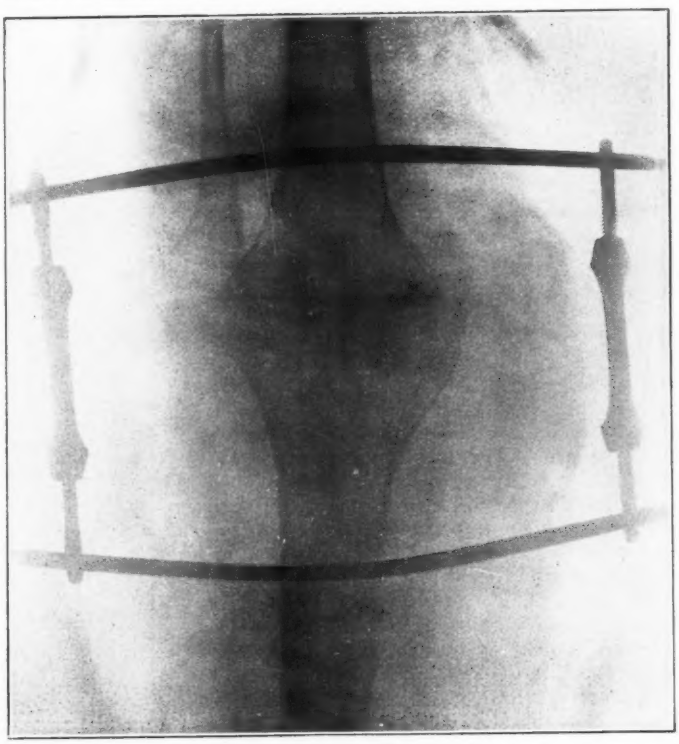


Fig. 3

Postoperative x-ray of preceding case showing the pins in position and the bones pulled together by turnbuckles connecting the pins.

Fig. 4

Same as preceding, lateral view. The outline of the bones is drawn in ink as they are obscured by the plaster cast and the pins.

pins will be bent and the bone ends separated. For this reason the surgeon should hold the leg and let his assistants apply the cast. It is well to begin the cast with a large posterior slab or mould and to use a similar mould along the anterior surface of the thigh and leg. The circular plaster is applied over the pins and turnbuckles. The tourniquet is not removed until the leg and lower thigh have become immobilized in the plaster. Then the plaster is continued up as high as possible on the thigh.

As soon as the plaster has been set a long narrow window is cut on each side to expose the turnbuckles and they are tightened until the pins are bent a little. As the ends of the pins are bent there is a tendency for the turnbuckles to fly off. To prevent this, the turnbuckles are pushed in close to the knee and the ends of the pins are wrapped with adhesive. It is well also to bind the turnbuckles to the pins with adhesive. The patient is put to bed with the leg elevated. A day or so later the turnbuckles are again tightened, the spring of the pins maintaining the pressure.

The pins are left in about eight weeks and the turnbuckles are inspected once or twice a week and tightened whenever necessary. During this period the patient should remain quietly in bed and should not be permitted to be up in a wheel chair or on crutches.

At the end of eight weeks the cast is bivalved and the wounds dressed and the limb is examined. If there appears to be firm union the pins are removed and a tight plaster cast is applied from the groin to the toes. The pin holes are dressed with vaseline gauze and will heal under the cast. The patient may now get up on crutches, but we have not encouraged weight bearing until eight weeks later (sixteen weeks after the operation). At the end of this time the second cast is removed and if the

Fig. 5

Same case as preceding eight weeks after operation. The pins have been removed and clinically there is solid bony union.

Fig. 6
Same case eight weeks postoperative, lateral view.

union seems firm by x-ray and clinical examination the patient may begin to bear weight upon the leg. If there is any doubt about the firmness of the union a new cast should be applied and weight bearing begun in the cast.

If there is not clinical union at the time of the first inspection (eight weeks after the operation) and if there is no infection around the pins, the turnbuckles should be tightened and a new cast applied and the pressure treatment continued for four weeks longer. If there is no union at this time the pins should be removed and the pressure treatment discontinued.

I have performed this operation on 5 cases of tuberculosis of the knee in adults and in 4 of these cases bony union was obtained in an unusually short time. The fifth patient died of sepsis. Two cases will be reported in detail.

Case 1.—A white woman, 17 years of age, had a history of pain and swelling in the left knee over a period of seven years. Six months before examination, after an injury, the knee became worse and she had been crippled since that time and unable to bear weight upon the leg. On physical examination, the left knee was moderately swollen and contained a small amount of excess fluid, but most of the swelling was due to periarticular thickening. Motion at the knee joint was not painful, but was limited about 50 per cent. The knee was not particularly tender and there was no excess heat. X-ray showed bone atrophy and erosion characteristic of tuberculosis (***Figs. 1 and 2.***) On January 7, 1930, an arthrodesis of the knee was performed according to the technic described above (***Figs. 3 and 4***). The postoperative course was uneventful except that the patient had an unusually small amount of pain after the operation. On March 11, 1930, the old cast was removed and there seemed to be bony ankylosis at the joint on clinical examination (***Figs. 5 and 6***) and the pins were removed and a new cast was applied and the patient sent home with instructions to wear the cast two months and then return for examination. At the end of that time the cast was removed, and there was firm bony union and she was told to begin walking on the knee without support. She has not returned, but writes that the knee is perfectly stiff and that she has had no trouble since the operation.

Case 2.—A negro boy, 23 years old, injured the right knee in 1925 while playing baseball. He had further trouble with the knee in February, 1926, and went to Hot Springs, Arkansas, where he was in the hospital

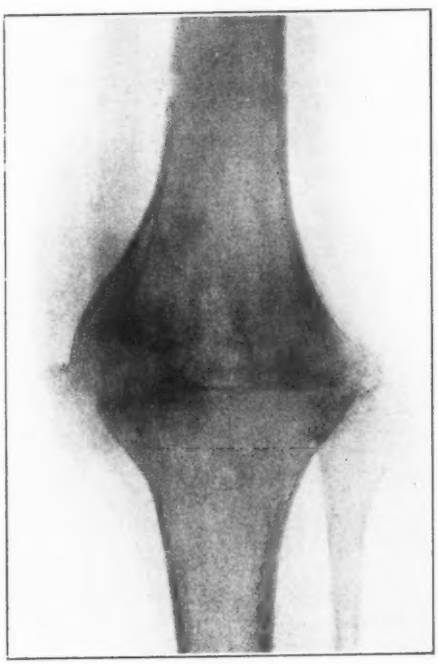


Fig. 7
Same case sixteen weeks postoperative.

Fig. 8
Lateral view, sixteen weeks postoperative. Patient walking without support, apparently cured.

for three months. He got along fairly well until 1928, when the knee began to swell again and became sore and stiff. He was seen at the Barnes Hospital Dispensary in March, 1930, where the clinical and x-ray diagnoses were tuberculosis of the knee, and he was sent into the hospital for arthrodesis. On April 22, 1930, an arthrodesis of the knee was performed according to the technic described above. Postoperative course was uneventful and he was discharged from the hospital on May 3, 1930, under protest. From that time he was lost track of until he reentered the hospital on May 8, 1930, because of vomiting, bloody urine, pain in the knee and fever. On entrance the operative wound was obviously infected. The patient was quite sick. The wound was dressed, the immobilization being continued by means of the pins, and he was given general supportive treatment with free drainage of the knee. On May 9, he was transfused, the infection did not improve. The temperature continued high and an abscess developed in the lateral side of the leg which was drained on May 18. He was again transfused on May 19. On May 26 a new plaster cast was applied to the leg leaving the pins in place. On June 11, 1930, an amputation was done in the upper thigh on account of sepsis. The condition at the end of the operation was poor. The patient was transfused, but went into coma and died about three hours after the transfusion. I believe that the failure and fatal results in this case were due to the neglect after the operation. This patient went home eleven days after the operation and had no attention until he returned with marked sepsis. It is for this reason that we insist upon the patient's remaining in bed and either in the hospital or under the direct supervision of the surgeon over a period of at least eight weeks after the operation, or until the pins are removed and the arthrodesis is clinically solid.

The advantages of the procedure are (1) it is simple; (2) it is safe; (3) the patient is more comfortable after the operation than after other methods which we have tried; and (4) bony ankylosis occurs more quickly and is more certain to occur than after any other method with which I am familiar. The only disadvantage is that two relatively large pins must be left in the tissues until ankylosis has been obtained. If these pins are made of stainless steel and if the postoperative care is not neglected I do not believe that there is so much danger from sepsis by this method as there is from sepsis because of incomplete immobilization. If one objects to the pins the same procedure can be performed with two Kirschner wires and stretchers which are connected by turnbuckles, so that the wires can be pulled toward one another.

DISCUSSION (*Abstract*)

Dr. W. B. Owen, Louisville, Ky.—From the x-ray pictures and from the clinical examination of the patients, fusion has been satisfactorily produced.

I am rather sorry in some respects that Dr. Key did not discuss conservative versus radical treatment.

It is our practice to apply a plaster of Paris spica, following a knee fusion operation. The results in most instances have been satisfactory.

Dr. Key's method of fixation is very excellent and I wish to commend him both upon the method and the results obtained.

Dr. Isidore Cohn, New Orleans, La.—I am reminded of the paper of Rollier, written about one year ago. Rollier said that he had not had occasion to excise or resect a hip in twenty-seven years and he had only done three arthrodeses in knee joints in the same period of time. His main objections to doing surgery on these cases, of course, is based upon his experience that they recover without surgery, where they have the benefit of proper heliotherapy, and I think we have to emphasize the words "proper heliotherapy." He thinks surgery should not be done because it lowers the resistance.

Dr. Key and others well qualified to do surgery in such cases can do it without getting into trouble; others might attempt it and do damage.

Dr. G. W. Leadbetter, Washington, D. C.—My experience has been, not only in tuberculosis, but in other conditions as well, that arthrodesis is difficult to obtain. I do not believe that positive pressure has much to do with the question of osteogenesis. We can draw two or three analogues from daily observation. For example, we know that impacted fractures of va-

nious bones often show a definite absorption line tarough the area of impaction, rather than any increased osteogenesis.

We also know that in badly traumatized fractures entering into the joints, destroying the cartilage and destroying bone at the lower portion of the joint, ankylosis does not often take place. There is always a small amount of residual motion.

We also observe in septic joints, where the cartilage is destroyed slowly, that we often do secure a firm fixation.

The factor that is present, particularly in joint injuries is, in the one, the question of hemorrhage which forms an effective block to thorough union, and, in the other, the question of infection, no hemorrhage, with contact of a denuded bone.

You can take x-rays of arthrodesed knee joints fixed in the usual manner and you will find that there is always a definite space between the two bones; that is, they are contacted well.

Around this portion of the knee we have no periosteum to proliferate and form early callus but must depend upon the endosteal callus. Dr. Key obliterates the space and allows no hemorrhage to occur therein, so that osteogenesis will come without interference. The bone will heal as well as any bone of normal consistency.

I believe that this is a subject very much worth while, and that those who are doing arthrodeses should attempt to report the results when they have a larger number of cases.

Dr. I. A. Arnold, Louisville, Ky.—In the treatment of tuberculous joints when it becomes necessary to sacrifice the joint, Dr. Key's method is quite unique for holding bones in immobile position if you have only the tuberculous infection and it is possible to close the wound completely. However, should there be a mixed infection such as he evidently had in the case of the negro boy reported, it will not work. There are three important points in connection with the treatment of tuberculous joints. First, immobilization must be absolute; second, complete removal of the joint structure including the patella is necessary; and third, the complete eradication of all evidence of infection. My plan in the case of mixed infection is to make a U shape incision over the knee and remove the patella, turn the flap back, cut the crucial ligament, prop the joint open with one or two gauze packs, put on a double incline splint and keep this open for five or six weeks until the joint surface has become completely removed and all evidence of infection has subsided. By this time, the ham strings will be sufficiently contracted and when the leg is straightened out the impaction is sufficient to hold it in position without any internal fixation whatever. The wound is closed and the plaster of Paris cast applied including the hip and foot.

Dr. Frank P. Strickler, Louisville, Ky.—The subject of pressure in growth of the bone is always of interest.

You have all seen Lane's plate, have seen screws put in and have seen what happens to them later on. Under pressure, we get absorption of the bone. What does pressure do? It interferes with blood supply, and when you interfere with b'ood supply you interfere with bone union as a rule.

I believe that Dr. Key's work is the result of perfect and maintained apposition, not of pressure at all. I believe if he produces extreme pressure in the joint that he will interfere with bone growth, and it is a matter of very fine judgment just how much these turnbuckles should be tightened. In my opinion, if you tighten them to a point where you get extreme pressure, you are going to do more damage than good. If you tighten them to a point of apposition, you will get good results. Very fine judgment is needed.

Dr. F. Walter Carruthers, Little Rock, Ark.—For fear there may be someone here who would misinterpret the question of se'ection of cases, the point should be brought out, that this type of operation should be done upon adults with tuberculosis of the knee and not upon children. This operation cannot be done in any case of tuberculosis. I would even question the advisability of doing it at the age of sixteen because of the disturbance in the growth of the bone.

I am glad that the essayist has brought out the question of apposition. This should certainly be done under guarded conditions because of the likelihood of disturbance to the blood supply.

In doing fusing operations, or arthrodeses, as Dr. Key terms them, I use in conjunction, either the long Steinman pins or the long twenty-penny nails. In my experience, the disheartening thing has been that these pins or nails get loose too quickly, like the Lane plate.

It is not so much the pressure as the maintenance of apposition that is important.

We should, if possib'e, use a long spica cast instead of a short one, to complete the immobilization. The essayist's method is certainly worthy of consideration and if handled guardedly, I believe it is an excellent method.

Dr. Key (closing).—I did not go into the question as to whether or not arthodesis should be done in tuberculosis of large joints, because at the present time orthopedic surgeons are split into two camps, for and against arthrodesis.

I favor arthrodesis and agree with Dr. Hibbs that heliotherapy has done more harm than good in the treatment of tuberculosis of bone and joints in this country, because people expect it to cure bone and joint tuberculosis.

Personally, I have never seen a case that I beleived to have been tuberculosis of the hip, or tuberculosis of the knee, that was cured by heliotherapy or any other conservative means which I did not think would have been better and more economically treated by surgical arthrodesis in the hands of a competent surgeon.

Pressure does not always cause atrophy of bone. Under certain conditions pressure will cause production of new bone and stimulate union. In the method presented in this paper it is not possible to gauge the pressure, but that does not seem to affect the result. I think it is quite true, however, that the fact that we do obliterate the dead space is one of the main factors in the success of the method.

If we did not use the pins a plaster spica would be necessary. I feel that by using the pins and keeping the patient in bed, the patient is more comfortable without a spica and has almost absolute immobilization. I assume that we all know that when we nail bones together with an ordinary nail the nail can be pulled out with the fingers within two or three weeks after the operation. It was partly because of this that I devised the method of inserting transverse pins which could be pulled together with a turnbuckle.

EXTERNAL DEFORMITIES OF THE NOSE AND THEIR CORRECTION*

By SIDNEY ISRAEL, M.D.,
Houston, Tex.

The correction of external deformities of the nose is frequently a social and economic necessity. The early work of Joseph in Berlin and Roe in this country, followed by the great accomplishments during the World War, has served as the necessary stimulus to focus rhinological attention upon the surgical problems involved and the satisfying reiults to be obtained.

Many of the patients, both men and women, before being operated upon, have undergone intense mental suffering, in a few instances bordering on self-destruction, because of the self-consciousness brought about by an unsightly deformity of the nose. The feeling of hopelessness and inferiority, socially and in the business world, is ofttimes encountered in these patients, and becomes a formidable symptom in addition to the deformity of the nose.

Familiarity with this type of surgery, coupled with an experience over a period of years, since my first publication,† has resulted in the solution of many heretofore difficult problems, and refinement of technic, both of which factors play no small part in the gratifying end-results obtained.

This type of surgery is necessarily classified in the field of the rhinologist for a better understanding of all the requirements and the end-results to be obtained.

The rhinologist should possess, or acquire, a meticulous care for accuracy in detail and an eye for harmony and beauty, or pleasing effects, as well as technical skill and tissue appreciation. There is no place for the opposite of these requisites.

The cases operated upon have been drawn from both private practice and the clinic.

The types of deformity have consisted of the following: hump nose (*Figs. 1, 2, 3, 4, 5, 6*); hook nose or elongated tip (*Fig. 7*); lateral bend, deviation or displacement (*Figs. 8, 9, 10*); saddle nose (*Figs. 11, 11A, 12, 13, 13A*); wide or African type (*Fig. 14*); and the deformities as a result of immediate fracture, simple or compound.

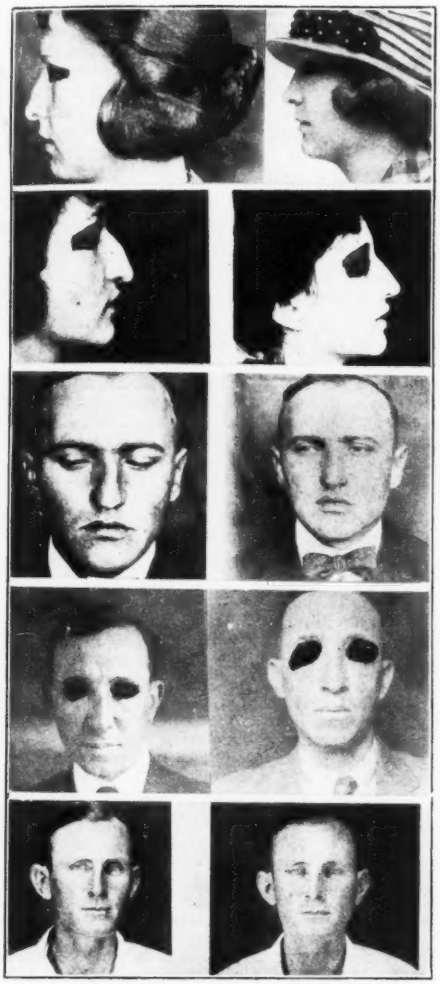
Local anesthesia is desirable, in the majority of instances, and when properly employed possesses many advantages over a general anesthetic.

The intranasal route with incision in the

Figs. 1 to 5, inclusive, reading from top downward.
Left—before operation.
Right—after operation.

*Read in Section on Ophthalmology and Otolaryngology, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

†Israel, Sidney: External Nasal Deformities and Their Correction. Texas State Jour. Med., 16:124, July, 1920.



Figs. 6 to 10, inclusive, reading from top downward.
Left—before operation.
Right—after operation.

vestibule obviously is always the method of choice.

In the correction of a saddle type of deformity, or depression of the dorsum or bridge, wherein scarcely a bridge of the nasal bones exists, no transplant has given such uniformly

Top, Fig. 11-a.
Center, Fig. 11-b.
Bottom, Fig. 12.—Traumatic saddle nose and cauliflower ear.
Left—before operation.
Right—after operation.

Top, Fig. 13-a.
Center, Fig. 13-b.
Bottom, Fig. 14.—Wide nostrils.
Left—before operation.
Right—after operation.
} Legends for illustrations at right.

good results as has rib cartilage, providing one's technic is in keeping with the type of surgery required.

The postoperative care of these patients should be uneventful. They suffer no pain, and other than the care of the skin and wearing of a suitable splint, their recovery is uninterrupted and complete.

CONCLUSIONS

(1) Local anesthesia is the method of choice.

(2) Children should not be operated upon for an external deformity (congenital) of the nose until they reach maturity.

(3) In utilizing a transplant for the correction of a depressed bridge or saddle deformity of the nose, rib cartilage has given the best results.

(4) The intranasal approach, or incision, should be selected because of the elimination of an unsightly scar.

(5) This type of surgery is essentially and should be in the field of the rhinologist.

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DISCUSSION (*Abstract*)

Dr. William A. Wagner, New Orleans, La.—The correction of external deformities of the nose is frequently a social and economic necessity, and at times plastic surgery of the nose is imperative. I agree with the essayist that the correction of external deformities of the nose is essentially in the field of rhinology. Since the rhinologist is more familiar with the anatomical structure of the nose and its physiology, it is his duty to correct them.

In correcting kyphosis, when the rasping method is used in preference to the saw, chisel or scissors, one must remove all of the spicules of bone from the soft tissue if sequelae are to be avoided. I have been using the endonasal route through the vestibule in reaching the part to be corrected, as was first described by J. O. Roe, and in order to facilitate access to the nasal pyramid I completely detach the columella from the septum above, as first demonstrated by Gillies of London, when a spacious approach is necessary. This need be done only when the dorsal prominence is somewhat large or markedly pronounced, when one is forced to deal with the ascending or nasal process of the superior maxilla. I have given up external incisions, as von Mangold's, the infraglabella incision, and others, so that I may obtain as perfect an esthetic result as possible. In hump noses that are markedly pronounced, which show a dilatation of the nostrils after correction, the removal of the lateral cartilage should be done.

In the correction of saddle nose, ivory as an implant material has been my choice. In spite of the prevailing prejudice against foreign bodies, ivory has proved its merit. Ivory cannot be classed with celluloid, paraffin and other materials, because it is after all an animal epithelial appendage similar to dentine or dense bone, and therefore more likely to be tolerated than the chemical bodies that have been previously used. With ivory the most we can hope for is that the patient's tissues will tolerate its presence without reaction, in which case the implant remains indefinitely without change; whereas in cartilage and bone grafts this is not true. Ivory is easily obtainable, its introduction is very simple and without risk, it is firm and light, smooth of texture, and easily shaped to the required needs. In case of infection it is easily removed and can later be replaced with no more trouble than originally.

Dr. Thomas A. Poole, Washington, D. C.—Dr. Israel rightly brought out the psychological disturbances of these patients. I want to add another point, and that is the re-establishment of drainage and ventilation.

When the nasal cavities are obstructed with no ventilation, no drainage, and with consequent anaerobic organisms rampant, what a picture! The patients feel the effects, not only from the psychological standpoint but also the toxic effects produced by obstruction of the nasal spaces and sinus cavities, often termed human incubators, which prevents drainage and ventilation with pure air. We must relieve this toxic absorption as well as the mental condition.

Dr. Arthur I. Weil, New Orleans, La.—Dr. Israel did not stress any method of operation, and I think rightly so, because it is not a matter of how we do it, but of our results. Of course, I think we all limit ourselves to the intranasal and vestibular routes. We do not want an external scar if we can avoid it.

The psychological effects of deformity on the patient are important, but I think more stress might be laid on the economic phase. I have seen a number of patients who were not in a position to get the work they needed because their appearance was repulsive. After the nose was corrected they were economically able to produce much better results than before.

Among my cases was a young lady with tuberculosis. She declined to be treated for the infection until her nasal deformity was corrected.

One point that has not been stressed in this paper was the number of patients who come requesting operation when operation is really not needed and not justified. I suppose all men who do this work have had a similar experience. I have had a number of patients who were absolutely miserable because they thought their nose was not the proper shape. Several I have refused to operate upon because I thought the nose was good, and would not be improved by operation. In two instances these patients have gone to other men and been operated upon. Their noses were not improved, and they have been more dissatisfied afterward than before. Now the physician is blamed for the disfigurement. So I believe we should be guarded about operating upon a nose unless it really is disfiguring.

Dr. Louis Daily, Houston, Texas.—The field of cosmetic nasal surgery belongs to the rhinologist who is trained in intranasal surgery.

The deformities to be corrected will depend upon the general facial contour. The nasal features which lend themselves to correction are a hump which may be removed, a hook nose which can be shortened and raised, a broad bridge which can be narrowed, and ex-

tessively large tip and nostri's which can be diminished. A single case may demand all these corrections, or only some of them. The naso-labial angle may also need changing. For saddle nose, partial or complete, I use ivory. Ivory can be filed and shaped to the individual needs, and spares the patient the resection of rib cartilage. I have used it repeatedly, and found the result most satisfactory.

Dr. Rufus J. Pearson, Miami, Fla.—I have enjoyed every paper I have heard since I have been attending the meeting, but particularly this paper presented by Dr. Israel. I wish to ask two questions.

Does a previous submucous resection interfere materially with the correction of these deformities? How long is the average patient incapacitated for duty after his operation?

Dr. Oscar Wilkinson, Washington, D. C.—I should like to ask a few questions: just how do you narrow down a wide nostril? Do you make a lateral incision in both vestibules very frequently? Personally in saddle-back noses without deflection I have found the columnar incision very effective, and if the incision is sewed with horse hair there is no scar. I also want to endorse the use of ivory in the saddle-back noses. It relieves the patient from the most difficult part of the operation, that is, taking out a piece of cartilage.

Dr. H. L. D. Kirkham, Houston, Tex.—A very common external defect of the nose is met with following some operations for deviated septum, and these defects, aside from their cosmetic appearance, give rise to a functional disturbance of obstructive breathing due to a compensatory hypertrophy which occurs in the nasal alae. These cases present a forceful argument against the doing of nasal plastic work by the rhinologist; for since the deformities result from rhinological operations it is difficult or impossible to persuade these individuals to submit to further work on their noses by another rhinologist.

Dr. Israel showed a slide which demonstrated typically the deformity resulting from a poorly performed septum operation in the correction of which I believe he used rib cartilage. It has been my experience that these defects can be corrected much more satisfactorily and with less discomfort to the patient by following the method as outlined, I believe, by Sheehan in which the alae cartilages are utilized to build the bridge. This has the added advantage that the ala deformity is simultaneously corrected. I believe it is significant that very few men with the exception of Joseph and a few of his followers are using ivory, if autogenous rib grafts can be obtained. Some years ago I saw several ivory grafts, which had been put in by Joseph, removed because they were acting as foreign bodies. Dr. Daily made the statement that should the graft bed become infected the ivory grafts can be removed and reinserted. I do not believe this is tenable. With the present use of rib cartilage grafts there is very seldom an infection and should this occur the cartilage is very resistant and is seldom disturbed by the process.

Dr. Israel (closing).—I have tried ivory along with other types of material that could be used for this purpose, and have had the opportunity of removing a number of pieces of ivory that had been placed in noses elsewhere. My experience is that if the technic is good, and if the cartilage has been properly cared for, there should be no difficulty with cartilage. Cartilage withstands infection better than any material I know of for use as a transplant. We have been extremely fortunate in our cases in avoiding infection and I can see no reason to change a successful technic for one that might be questionable.

Each man must develop his own technic. The work of Joseph, Rowe and others has demonstrated this factor in the good results obtained.

Submucous resection does not interfere with the correction of external deformities, and it becomes frequently necessary to do a submucous resection before the plastic or correcting operation is performed. The postoperative course should be uneventful. The patient is not incapacitated. He suffers no pain, but it is necessary for him to wear a splint for a week or ten days. Hospital confinement is generally two or three days, and further care can be carried out in the office.

An incision is frequently made in the vestibule of both nostrils. I prefer this to the columella incision, because there we run no risk of scar, whereas I have seen cases following a columella incision that developed infection in the suture line with a resulting scar.

OCCUPATION AND RESPIRATORY DISEASES*

By ALBERT E. RUSSELL, M.D., F.A.C.P.,†
Washington, D. C.

The subject of occupation and respiratory disease is a large one, and the time allotted for this paper will not admit of a lengthy discussion of it. I shall, therefore, confine my remarks principally to the respiratory conditions which are due to exposure to various types of dust.

It would be a very difficult problem to estimate with any degree of accuracy the number of people in the United States who are engaged in dusty trades. In fact, under the present arrangements in the different states, such an estimate would be practically impossible. This I learned last year when I was preparing my paper for the International Silicosis Conference. There are more than a half million workers engaged in the coal mining industry in the United States, and it has been stated that there are more than 20,000 workers in New York City alone who are engaged in dusty occupations. It is evident that more people are exposed to dust, which constitutes the greatest single industrial hazard, than is generally supposed.

Dust is possibly the oldest source of indus-

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*Read in Section on Public Health, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

†P. A. Surgeon, United States Public Health Service.

trial hazard. Knowing as we do how dust is generated, we may assume that as far back as the stone age and further, people have been affected by it. Certainly the Greeks, Romans, and Egyptians must have encountered dust hazards in connection with their extensive construction work with stone. The harmful effects of dust are mentioned in Greek literature, but the Italian writer, Ramazzini, gave us in the Eighteenth Century the first detailed account of the action of this industrial factor upon the worker.

It is singular that dust as an etiological factor of disease did not receive much attention until during the past 25 years. The rapid industrialization that has come about within this period is probably explanatory of the impulse toward the study of this source of industrial hazard. The advances which have been made in all branches of industrial medicine have also helped to center attention on dust and its effect upon the health, inasmuch as the number of the workers in dusty trades is larger than that of any other group that is exposed to a single industrial hazard; and an additional reason for increased interest in this subject is gathered from the study of mortality statistics, which have revealed the fact that workers in dusty trades have an excessive death rate from tuberculosis, as well as from other respiratory diseases.

In the consideration of dust as an etiological factor in pulmonary disease, the following points must be taken up:

(1) The chemistry of dust.
(2) The concentration and the size of its particles.
(3) The length of exposure to it.
(4) The effects produced—
    (a) morbidity,
    (b) physical condition,
    (c) pathology,
    (d) mortality.

CHEMISTRY OF DUST

The dusts most frequently met with in the industries are inorganic, and incidentally such dusts are the more harmful. It has been shown that silica alone produces more permanent pulmonary damage than all other elements found in industrial dust. Originally the dangerous properties of dust were supposed to be dependent upon certain physical characteristics, such as hardness of particles and sharpness and angularity of edges. No doubt the physical or mechanical action of dust is a factor in producing chronic pathological conditions in the upper respiratory passages and the bronchi, but the theory that silicosis is produced solely by such action has been generally abandoned.

Dr. Collis,[1] in his statement relative to the chemistry of dust, was one of the first to draw attention to the chemical rather than the physical action of dust. He said:

> "Generally speaking, dusts are more injurious as their chemical composition differs from that of the human body or from the elements of which the body is normally composed, whence it follows that animal dusts are less injurious than others."

Collis[2] further says:

> "A study of phthisis mortality rates in dusty occupations has, then, established the fact that when phthisis occurs in excess, it is always found associated with exposure to dust containing crystalline silica."

The petrographic analysis of dust is as important as the chemical analysis. For instance, the chemical analysis of cement dust indicates that there is 15.2 per cent of silica present, while the petrographic analysis shows that it contains only 1 per cent of free silica or quartz, the known dangerous element. Likewise, chemical analysis of (Barre, Vermont) granite shows that approximately 70 per cent of silica is present in it, while by petrographic analysis only 35 per cent of quartz is found. This method distinguishes the free silica from the silicates.

Kettle's[3] final opinion of why silica dust is dangerous, as far as the production of tuberculosis is concerned, seems to be that it is not because of the fibrosis produced by the silica, nor because of the damage which silica does to the lymphatic system, but that it is simply because of the presence of silica in the lung.

Gardner's[4] experimental work with animals inoculated with a strain of tubercle bacilli of a low virulence and later exposed to dust is noteworthy. A series of guinea pigs were primarily infected by the inhalation of tubercle bacilli of low virulence. The animals developed an infection, which finally healed by resolution. By placing groups of these infected animals in dusting chambers and subjecting them to at least two months' exposure to dusts, a reactivation of the primary tubercles was brought about as late as 206 to 400 days after infection. Of these pigs exposed to quartz dust, 73.6 per cent exhibited evidence of a progressive tuberculosis, and likewise 31.8 per cent of those exposed to carborundum dust (SiC) and 26.3 per cent of those exposed to granite dust. The groups of pigs exposed to marble and coal (bituminous) dust did not undergo a reactivation of the disease. Dr. Gardner states that "the reaction appears to be a specific result of the inhalation of certain defi-

nite types of dust, for evidence has been produced to show that factors like overcrowding, lack of proper ventilation and light, endemic pneumonia, and non-specific inflammations have not influenced this type of tuberculous infection."

Apparently the same effect is not obtained with other bacteria in the dusted pulmonary tissues as with tubercle bacilli. The excessive amount of other respiratory diseases can be accounted for, however, by the lowered local resistance caused by the presence of dust, the diminution of the local blood supply by fibrosis, and the excess of bacteria carried into the lungs on the dust particles.

CONCENTRATION OF DUST

It is necessary to know the concentration of a dust before a definite decision can be made that such a dust is harmless *per se* or that its lack of harmful effect is due to some other element existing in combination with it. A low concentration of a dust containing a high percentage of free silica (quartz) may produce as much harm as a higher concentration with a lower percentage of silica. The fallacy of estimating the extent of dustiness without dust counts is obvious, in consideration of the fact that the particles found in the lungs of workers are less than 10 microns in diameter, and, therefore, cannot be seen with the unaided eye.

Studies of groups of workers exposed to varying concentrations led to the conclusion that 10 to 20 million particles per cubic foot of a dust containing about 30 per cent of free silica as quartz could be tolerated without great injury. Workers exposed to this concentration of such dust over long periods developed a mild fibrosis, not of sufficient severity to predispose to tuberculosis. The concentration of dust is a deciding factor in determining dust hazards. If the effects of dust can be shown by x-ray or by physical examination, proof of excessive dust is given; if, however, a worker is exposed to an unknown quantity of a supposedly dangerous variety of dust and does not develop pulmonary changes, it is likely that, in so far as silica is concerned, the concentration is within tolerable limits, or possibly the dust particles may be large—that is, more than 10 microns in diameter.

LENGTH OF EXPOSURE AND SIZE OF DUST PARTICLES

The study of silicosis which we made in the granite industry will be used as a basis for the following discussion, since it is considered representative of silicosis among a group of workers who are exposed to varying concentrations of a dust containing a known quantity of free silica or quartz.

The extent of exposure of these granite workers is indicated as follows: Group D, 10 million particles per cubic foot or less; Group C, 10 to 20 million; Groups A-B, 20 to 60 million.

Fig. 1 shows the number of persons without silicosis and the number diagnosed as having either early or more or less advanced silicosis, according to the number of years of exposure and according to the dust group in which their exposure places them.

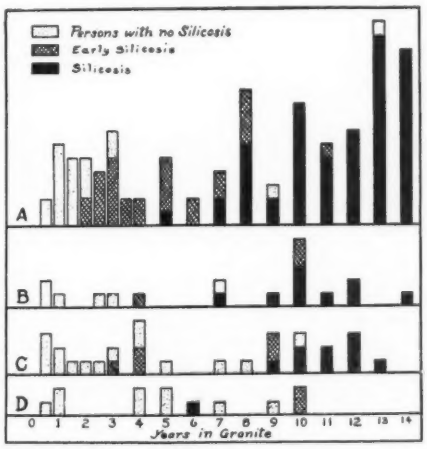

Fig. 1
Persons with and without silicosis in the four dust count groups, by length of service.

We may say that practically 100 per cent of the granite workers who were exposed to dust particles in the concentration of 40 to 60 million particles developed silicosis by the end of 15 years' service. It is evident that if the silica content of the dust were greater or if the concentration were greater, silicosis would develop earlier. The size of the dust particles in this occupation was generally less than 10 microns in the greatest diameter, the greatest number being less than 5 microns.

EFFECTS OF EXPOSURE TO DUST

The effects produced by the inhalation of dust are now considered, under the headings of morbidity, physical condition, pathology, and mortality. Silicosis and tuberculosis are outstanding here, inasmuch as they cause a greater

amount of disability and mortality in the dusty trades than any other diseases or combinations of diseases.

The incidence of sickness (8 days or more) from all causes in the four dust count groups by length of service is shown in *Fig. 2*. It is clearly indicated that the men with the greatest exposure have more illnesses. Even when sickness from tuberculosis is eliminated, the rates were still higher in Groups A and B than in C and D.

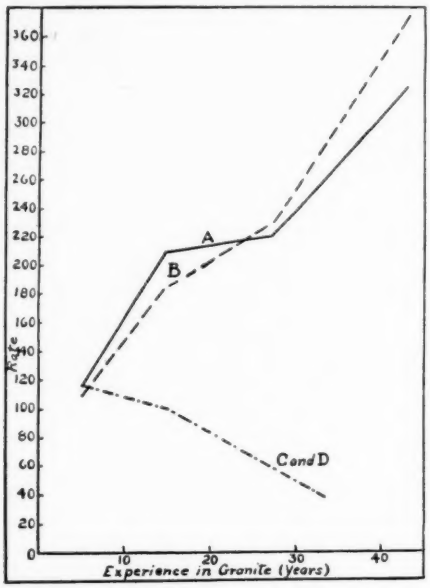

Fig. 2

Incidence of sickness from all causes in the four dust count groups by length of service. Eight days and more (rate per 1,000).

Fig. 3 shows how the rates shown in the previous graph (*Fig. 2*) have been increased by tuberculosis. This figure shows also the prevalence of tuberculosis (active) by length of service and by dust count groups.

The effects of concentration of dust and of length of service are clearly shown in this graph. The workers (Groups A and B) who had the greatest exposure developed silicosis and tuberculosis in greater frequence with length of service.

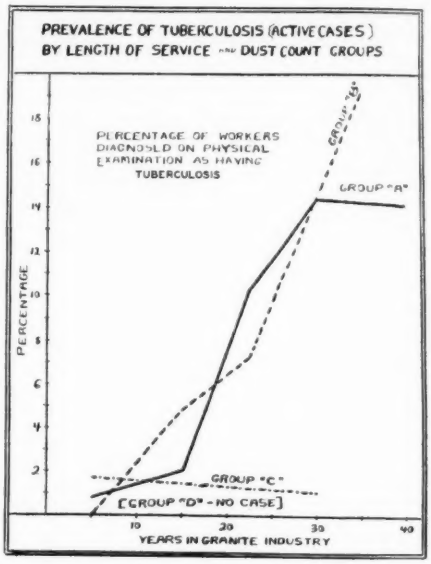
PREVALENCE OF TUBERCULOSIS (ACTIVE CASES)
BY LENGTH OF SERVICE AND DUST COUNT GROUPS
PERCENTAGE OF WORKERS DIAGNOSED ON PHYSICAL EXAMINATION AS HAVING TUBERCULOSIS
PERCENTAGE
GROUP "A"
GROUP "C"
[GROUP "D" - NO CASE]
YEARS IN GRANITE INDUSTRY

Fig. 3

The next graphs are presented to show the frequency of disability due to respiratory diseases alone lasting more than a week (accidents excluded) in various industries.

Fig. 4 shows the excessive amount of tuberculosis among granite workers, its incidence being greater than that of influenza. The relatively low incidence of tuberculosis among gold

FREQUENCY OF DISABILITY LASTING LONGER THAN ONE WEEK ON ACCOUNT OF TUBERCULOSIS AND PNEUMONIA IN INDUSTRIES SPECIFIED

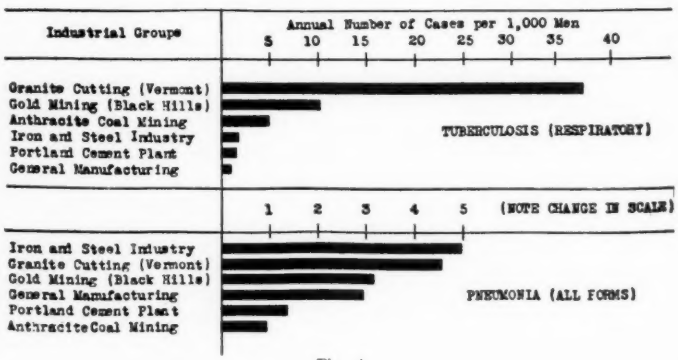

Fig. 4

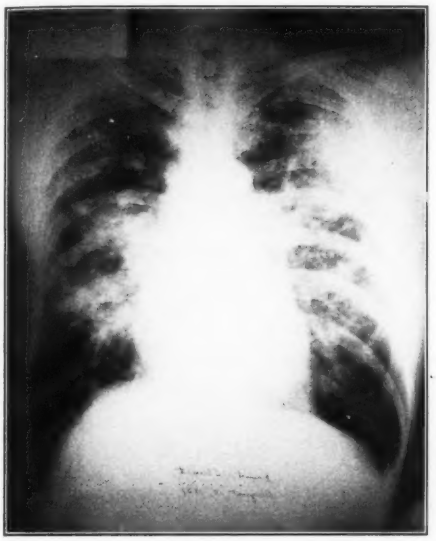

Fig. 5
Granite cutter for more than twenty years. Silicosis. Possibly latent tuberculous infection.

miners, who are exposed to a highly siliceous dust, may be due to the shorter length of their service as compared with that of granite workers.

The lower portion of the figure deals with the occurrence of pneumonia. The iron and steel workers, who have had the lowest incidence of sickness shown in these figures, have the highest sickness rate from pneumonia. The anthracite miners were lowest in pneumonia.

The records from which data were taken for the general manufacturing group were provided by plants in the Northern states and east of the Mississippi River. Practically all the groups have similar climates, and it is believed that these states are comparable and that variations in climates have not materially affected them.

DIAGNOSIS OF SILICOSIS

The diagnosis of silicosis is often very difficult, especially in its earlier stages. It is necessary to take into consideration the following points (these were set forth at the International Conference on Silicosis which was held at Johannesburg last year):

(a) Employment history.
(b) The symptoms and physical signs.
(c) The radiological findings.

It was agreed at the International Conference that silicosis could be conveniently divided into three stages, designated as first, second, and third.

In the differential diagnosis of silicosis as distinguished from other pneumonoconioses, a history must be established of exposure to inhalation of silica dust in a quantity reasonably commensurate with the clinical and radiological findings.

In the first stage, symptoms referable to the respiratory system may be slight or even absent. Capacity for work may be slightly impaired. There may be a departure from the normal in percussion and in auscultatory signs, and the radiograph must show an increased density of linear shadows and the presence of discrete shadows, indicative of nodulation.

In the second stage, there is an increase of the physical signs observable in the first stage, and the radiograph shows an increase in the number and size of the discrete shadows indicative of nodulation, with a tendency to their confluence. There must be some degree of definite impairment of working capacity.

In the third stage all the above conditions are grossly accentuated and indications of areas of massive fibrosis are usual. There is serious or total incapacitation.

Pulmonary tuberculosis may be present in

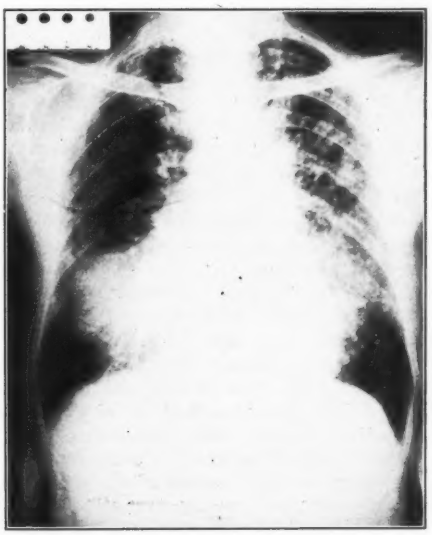

Fig. 6
Granite cutter for twenty-five years. Silicosis and early tuberculosis.

any of the above described stages of silicosis, altering the symptoms, physical signs, and radiographic appearances, and the degree of working capacity. Its presence must, therefore, influence the stage classification of the individual, and the classification must, under such cirsumstances, be based more upon the degree of loss of working capacity than upon physical signs and radiographic appearances.

TUBERCULOSIS AS A COMPLICATION OF SILICOSIS

It is not surprising that workers who have latent tuberculous infection become disabled earlier than the average individual. It was our experience that these cases developed silicosis more rapidly, and that when they developed the clinical tuberculosis, they were still young people and the disease ran a more prolonged course. This was not true of the cases which developed silicosis first. The South African investigators, too, have observed that the cases which they classify as "phthinoid" break down with tuberculosis early in their mining careers. Even though the early hazard of tuberculosis may not be so great from silica dusts as in other trades, the condition of silicosis eventually increases greatly the danger of active tuberculosis infection.

DIAGNOSIS OF TUBERCULOSIS COMPLICATING SILICOSIS

Physical examination of silicotic patients who are breaking down with a tuberculous complication provides information which is not always available with the x-ray. Dr. Pancoast stated in a talk on pneumonoconiosis at a meeting of the Washington, D. C., Medical Society recently that during this transitional stage the differential diagnosis by x-ray alone is often impossible. When the tuberculous complication has advanced, diagnosis is, of course, easy.

Inquiry into the patient's condition will usually reveal symptoms which are common to uncomplicated tuberculosis. It was our experience that early complaints were fatigue, night sweats, increase in dyspnea, pains in the chest, and an afternoon rise in temperature. There was frequently complaint of a cough, which was productive. Many patients had hemoptysis and later in the disease frank hemorrhages from the lungs. Loss of weight did not seem to occur so early as in uncomplicated cases, but when this symptom became manifest, it was marked. Tubercle bacilli were usually found in the sputum early in the disease.

The later stages presented no great differences from those fulminating types of uncomplicated tuberculosis.

The physical signs presented variations from those in uncomplicated cases, inasmuch as there existed already a general pulmonary fibrosis. The latent or post-tussic rale was constant and not unlike the same valuable pathognomonic sign in uncomplicated cases of tuberculosis.

The x-rays of cases in this stage usually revealed areas of conglomeration, or fusing, of fibrotic markings. They were less distinct in character than in uncomplicated silicosis. This fact is demonstrated in *Figs. 7* and *8*.

COURSE OF SILICOSIS AFTER CESSATION OF EXPOSURE TO SILICA DUST

Silicosis persists after the cessation of exposure to silica dust. The histories of the patients and the progressive nature of their symptoms seem to indicate that silicosis even continues to advance after cessation of exposure. This experience is common with that of other investigators, particularly in South Africa, where about 300,000 persons are employed in gold mining

Possibly you have thought that too much stress has been put upon silicosis. It constitutes, however, one of the major industrial hazards, and I believe that it merits more attention than it has received. You, as Southern health offi-

Fig. 7
Granite cutter for more than twenty-five years. Silicosis and tuberculosis.

Fig. 8
Granite cutter for thirty-six years. Silicosis and tuberculosis. (This patient cut some of the statues in the Union Station in Washington, D. C.)

cers and physicians, have already seen this to be a fact, and with the further industrialization of the South there will come into it more dusty trades. There is scarcely any large industry where a few dusty occupations do not exist. I hope that you will give the subject more study and be able to advise the manufacturer about dust prevention when he asks your help.

PATHOLOGY

It seems pertinent to refer again to the etiology of silicosis in connection with its pathology. The work of Dr. L. U. Gardner, of Saranac Lake, New York, upon the etiology and pathology of silicosis and tuberculosis cannot be too highly commended.

The summary of the pathological changes in silicosis which was made at the International Silicosis Conference is as follows:[5]

It was agreed that the pathological changes of silicosis are:

(a) The development of a condition designated in South America as a fine bronchiolitis, characterized by an accumulation of dust-filled phagocytes in the terminal bronchioles, and possibly some desquamation of their epithelium.

(b) The accumulation of dust-containing phagocytes about and in the intrapulmonary lymphoid tissue, especially in the subpleural zone, and their transportation through the lymphatics into the tracheobronchial lymph nodes.

(c) The gradual development of fibrous tissue within the mass of phagocytes and the formation of a characteristic nodule of hyaline fibrous tissue.

(d) Degenerative changes in these foci.

(e) The hyaline nodules increase in size by extension at their periphery.

Coalescence of adjacent nodules takes place and brings about involvement of extensive areas of the lung.[5]

Macroscopically the changes observed are:

(a) *In the early stage:* A variable number of palpable pearly-white nodules up to 2 or 3 cm. in diameter on the pleural surface of the lung. On section, the cut surface is studded with pigmented foci, widely scattered, which are only just palpable. The tracheobronchial lymph nodes are slightly enlarged and deeply pigmented and may exhibit foci of fibrous induration.

(b) *Later stage:* The fibrotic nodules are increased in number, size, and density, and coalescence of these may be found. The portion of the lung between the fibrotic nodules is emphysematous. The tracheobronchial lymph nodes are still pigmented, smaller in size than those seen in early stage, and uniformly fibrosed.

The presence of tuberculous infection usually modifies the pathological appearance. Special attention was drawn to the three following types:

(a) The type in which the picture of simple silicosis is little, if at all, modified, and in which only a biological test can demonstrate the presence of *B. tuberculosis.*

(b) That in which the coexistence of silicosis and typical tuberculous lesions is easily recognizable.

(c) That in which the presence of tuberculosis is easily recognizable, but the existence of silicosis is more difficult to determine.

MORTALITY

The influence of dust upon mortality from tuberculosis is clearly indicated. New methods of manufacturing stone which created excessive dust by the use of pneumatic tools were introduced in the granite industry about the beginning of the present century, and the tuberculosis rate has increased rapidly with their use. The rate has risen in direct proportion to the length of time during which they have been employed, as follows:

1.5 per 1,000	1890-1894
10.8 per 1,000	1910-1914
19.5 per 1,000	1924-1926*

A consideration of the mortality statistics of Barre, Vermont, shows that there has been an excessive death rate from pneumonia and other respiratory diseases (tuberculosis excluded) during this period.

*During period of our observations.

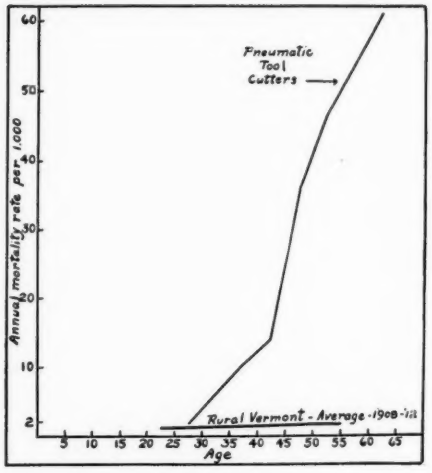

Fig. 9
Age curve of mortality from tuberculosis among hand-pneumatic tool cutters and in rural Vermont (males).

Fig. 9 shows the age curve of mortality between workers using hand-pneumatic tools and the males in rural Vermont. The rate of the latter may have been influenced by the fact that many disabled cutters move to rural districts. However, the contrast between the two rates is great. It is apparent that nothing can be done to cure silicosis and very little to prevent the tuberculous complication which almost invariably happens in time. The solution is proper ventilation at the source of the dust, or, better still, where possible, the prevention of the generation of dust. Carelessness on the part of the worker and the employer is often responsible for excessive and needless dust. When dust is generated, it should be in as small quantities as possible, and there should be proper ventilation to remove it at its source. Too much dependence has been put on masks, and other preventive measures have been overlooked. Ordinary masks are, on the whole, unsatisfactory.

SUMMARY

Morbidity and mortality records indicate that workers exposed to dust have excessive rates of respiratory diseases.

Inorganic dusts produce more pulmonary disability than organic dusts.

Silica (SiO_2) of the crystalline variety (quartz) is the element in dust which produces greatest pulmonary damage, and it is present in varying extents in most industrial dusts.

Silicosis is insidious in its onset and progress and presents but few symptoms or physical signs in its early stages.

Silicosis is with a high degree of frequency complicated by active tuberculosis after a number of years of exposure, depending largely upon the concentration of the dust and the percentage of free silica which it contains. Latent tuberculosis is usually activated after an even shorter exposure to siliceous dust, and in the resulting condition the tuberculosis has more characteristics of the disease as found in persons not in dusty trades.

Before a dusty trade can be absolved of its danger or stamped as dangerous, the concentration of dust and its chemical and petrographic analysis must be shown.

Masks frequently give a false sense of protection. Removal of dust at its source is preferable.

There has been a great reduction in the death rate from tuberculosis among the general population during recent years, while among workers in dusty trades there has been a great increase during the same time in the death rate from this cause.

REFERENCES

1. Collis, E. L.; and Greenwood, Major: The Health of the Industrial Worker. Philadelphia: P. Blakiston's Son & Co., 1921, p. 300.
2. Collis, E. L.: Industrial Pneumonoconioses with Special Reference to Dust. Phthisis. Milroy Lectures. Public Health, London, 1915, 29:16.
3. Kettle, E. H.: Experimental Silicosis. Jour. Ind. Hygiene, 1926, 8:491-495.
4. Gardner, L. U.: Amer. Rev. Tuber., Dec., 1929, 20:833.
5. Records of the International Silicosis Conference, Johannesburg, 1930. Summary, International Labor Office, Geneva.

DISCUSSION (*Abstract*)

Dr. M. F. Haygood, Alto, Ga.—Dr. Russell has chosen for his paper a very inclusive title, but has limited his discussion to a relatively small, although a most important and timely, fraction of industrial or occupational hygiene.

Whether we desire it or not, capital appears to be inclined to invest in land, factory sites, machinery, labor, and raw material in our section of the country. We should do well to encourage investors in this type of enterprise. Certainly they stimulate additional markets for farm, forest, mine, dairy, and quarry products. They offer employment to a larger portion of our population and often supplement our almost depleted public treasuries.

As pointed out by the essayist, there is no exact record of the number of persons engaged in the dusty trades. The percentage of our population engaged in other hazardous industrial occupations also is an unknown quantity. I feel sure that many of you have shared liberally with me in the ignorance of the following facts presented by Dr. Russell:

(a) That the tuberculosis mortality experience of

granite workers has increased approximately twelvefold during the past thirty years.

(b) That inorganic dust produces more pulmonary damage than that of organic origin.

(c) That silicosis is caused almost entirely by dust containing not less than 35 per cent of the crystalline variety of SiO_2 (quartz), and that tuberculosis almost invariably complicates silicosis, at least following long exposure to the dust.

(d) That the deleterious effects of dust are caused by those particles 10 microns or less in diameter and a concentration of not less than 20 million particles to the cubic foot.

(e) That it is the chemical or biochemical and not the mechanical effect of silica dust that is primarily responsible for the stimulation of the development of pulmonary tuberculosis.

Dr. Russell (closing).—Industrial hygiene is one of the newer specialties in medicine and represents our profession's response to the great need of medicine and public health in industry. It offers many opportunities. You as health officials no doubt have received requests from industries for information and assistance in industrial health problems, and the number of such requests will increase with the further industrialization of the South.

Industrial hygiene offers you an opportunity to extend your health activities into a new field. It will give lucrative results not only in health work, but in friendships with industrialists who will become strong supporters of your department and its projects. I am sure that you believe that the logical place for a state unit of industrial hygiene is with the state health department.

TREATMENT OF ADAMS-STOKES' SYNDROME WITH ESPECIAL REFERENCE TO THE USE OF EPHEDRINE*

By J. Edwin Wood, Jr., M.D.,
University, Va.

Excessive slowing of the pulse in heart block may lead to a train of symptoms varying from transient vertigo to syncope with mild convulsive seizures. The clinical events following the longer periods of ventricular standstill have been familiarly known for many years as Adams-Stokes' syndrome. The immediate cause of the vertigo, unconsciousness, and convulsions may be assigned to cerebral anemia, but the true nature of this excessive ventricular slowing is not always clear. Despite this confusion over the pathogenesis of the condition, some attempt must be made to alleviate the harrowing symptoms and at times to forestall death itself.

Agents sought to prevent this abnormal slowing of the pulse or revive a ventricle in standstill have resolved themselves into a consideration of three drugs, namely, barium chloride, epinephrine, and ephedrine.

It is the primary purpose of this paper to discuss ephedrine action upon three patients with heart block, two of whom have suffered from Adams-Stokes' seizures. Owing to the striking similarity of action displayed by ephedrine and epinephrine, opportunity arises for a comparison of their effects. Although the data herein presented is too limited for absolute conclusion, it will be shown that epinephrine and ephedrine may play important roles in the alleviation and prevention, respectively, of ventricular asystole. Comment will be made upon the speed of action, the administration, and the relative dangers of the two drugs.

Aside from its general epinephrine-like action, ephedrine as a cardiac stimulant does not receive unequivocal support in the animal experimental field. After a complete review of the situation, Chen and Schmidt[1] state that though smaller quantities of ephedrine may show a marked cardiac stimulant effect in the mammalian and human heart and less so in the amphibian heart, there is no doubt that ephedrine in large dosage may be depressant to the amphibian and mammalian heart.

Our own experience with animal experiments has been interesting though limited. In the perfused turtle's heart, dilutions of 1:10,000 and even 1:25,000 ephedrine frequently gave depressant effects. Stronger concentrations always caused cardiac depression or cardiac standstill. We produced mild stimulant effects with a perfusing fluid containing 1:50,000 ephedrine. Further investigation showed that the heart block and ventricular standstill brought about in the turtle's heart by continuous perfusion with 1:3,000 quinidine sulphate was unaffected by the addition of 1:50,000 ephedrine. However, ventricular activity promptly returned with the addition of 1:400,000 to the perfusate. Although it is unwise to reason from the amphibian to the human heart, the experiment just related fortifies the clinical belief that epinephrine is the drug of choice in ventricular standstill. Confirmation of this and similar experiments upon the mammalian heart seem highly desirable.

In cats, ephedrine in doses of 4 to 15 mg. in-

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*Read in Section on Medicine, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

*From the School of Medicine, Department of Internal Medicine, University of Virginia, University, Virginia.

travenously has failed to alter the appearance time of asphyxial block. In our animals 2:1 or higher grades of block could generally be produced by two and a half to three minutes of asphyxiation. With the animal under ephedrine the block generally appeared in two to two and a half minutes. Following intravenous epinephrine administration in cats we have twice failed to produce asphyxial heart block, and ventricular tachycardia and fibrillation have resulted (*Fig. 1b*). It may be surmised from these limited observations that ephedrine in physiological dosage does not materially affect A-V conduction, nor does it produce marked cardiac stimulant effects. This latter point has been emphasized by Chen and Schmidt.[1] Ventricular fibrillation has not occurred in our animals following physiological doses of ephedrine. Others[1]

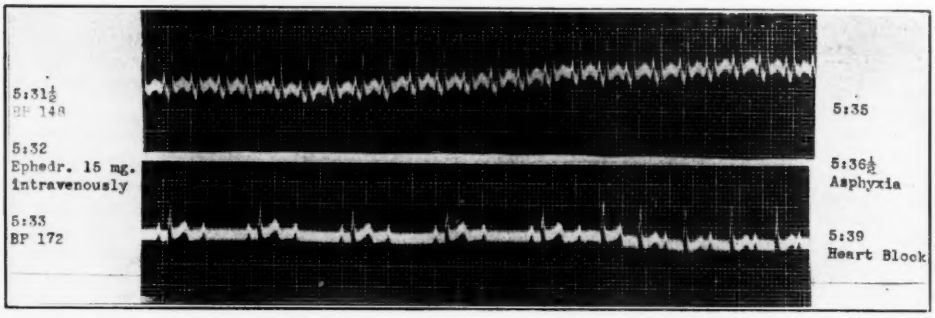

Fig. 1-a
Cat. Asphyxial heart block, not influenced by ephedrine.

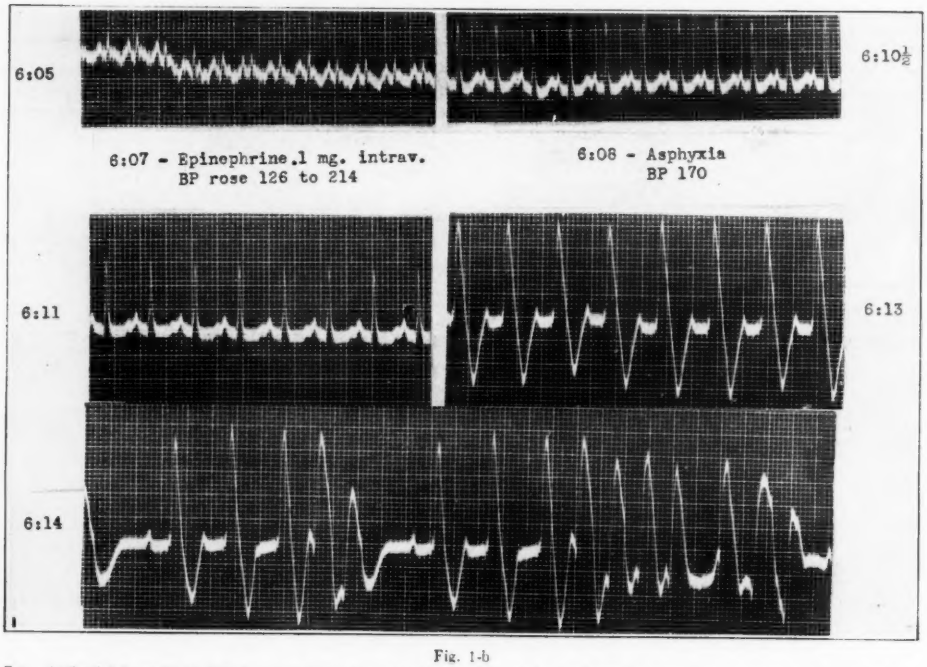

Fig. 1-b
Cat. Asphyxial heart block fails to occur following epinephrine. Ventricular tachycardia preceding ventricular fibrillation.
Note: In Figs. 1-a and 1-b standardization of 1 mv. equivalent to 2 cm. All other tracings have usual standardization of 1 mv. equivalent to 1 cm.

have noted it in dogs after the injection of large toxic doses. That ephedrine is less likely to contribute to the appearance of ventricular fibrillation than epinephrine has been shown by La Barre.[2]

Although a brief for ephedrine as a cardiac stimulant may be difficult to establish experimentally, clinical observations have made a place for the drug in the treatment of Adams-Stokes' syndrome. The prolonged effect of this drug and adaptability to oral administration along with its epinephrine-like action are the special features that have stimulated clinical interest thus far. Hollingsworth[3] first tried ephedrine for the relief of Adams-Stokes' attacks. His patient was having seizures every few minutes. Although barium chloride had failed, ephedrine (50 mg. orally) relieved the spells of syncope in thirty minutes. Continued use of the drug prevented the syndrome while omission of

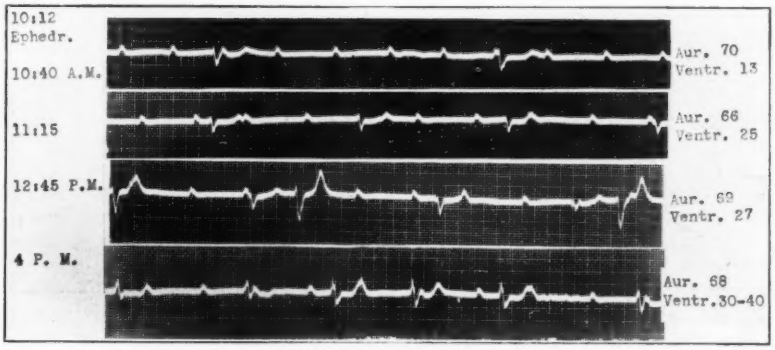

Fig. 2-a
Clinical case of complete heart block, ephedrine effect.

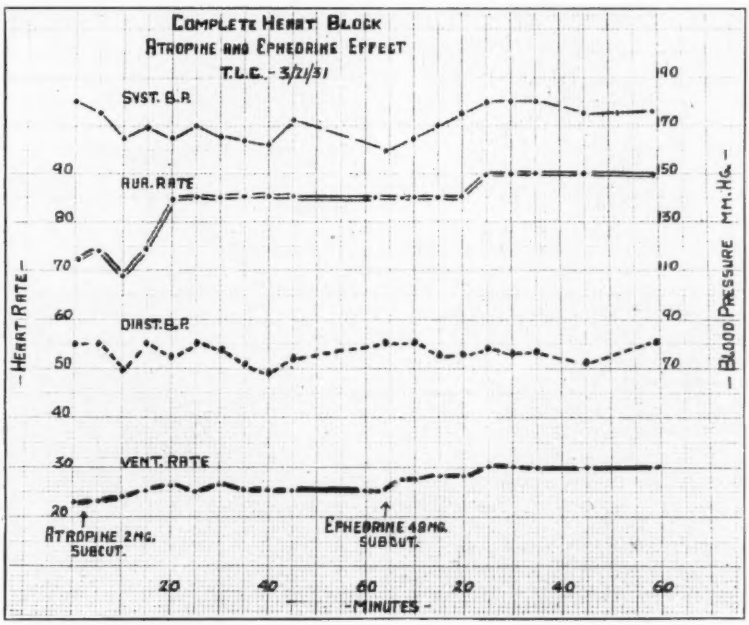

Fig. 2-b

the ephedrine was followed forty hours later by a recurrence. Similar success with the oral administration of ephedrine has been reported by Stecher.[4] In his patient transient relief was also afforded by subcutaneous epinephrine. Parade and Voit[5 6] describe a severe instance of Adams-Stokes' syndrome unaffected by thyroxin, caffeine, or digitalis. Epinephrine afforded only transient relief from the severe seizures, but synthetic racemic ephedrine taken orally gave practically complete comfort over a period of two years. At the end of this time the drug was discontinued and the patient died before epinephrine could be given.

We have used ephedrine in two patients with Adams-Stokes' syndrome. In the first (*Case 1*) the attacks of syncope increased in number and severity in spite of adequate barium chloride dosage. Arguments for[7 8 9] and against[10 11] the use of this drug have been presented in the literature. For eight months, 90 to 160 mg. of barium chloride was given daily without amelioration of the condition. Immediate relief followed the administration of ephedrine (*Fig. 2a*), and with continued use of this drug the patient has remained free from seizures over an eighteen-month period. On one occasion following withdrawal of the drug minor attacks began within thirty-six hours and continued until relieved by ephedrine.

In this same patient the grade of block remained unchanged following atropin, and at the height of the atropin effect a mild but definite reaction was produced by the subcutaneous injection of ephedrine (*Fig. 2b*). According to Chen and Schmidt[1] the effect of ephedrine following full atropinization has not been previously recorded in man.

To illustrate epinephrine action upon complete heart block, frequent electrocardiograms and blood pressure readings were recorded after *Case 1* had received one milligram of epinephrine subcutaneously (*Fig. 3a*). The heart began to respond to the drug within two minutes, and a maximal effect appeared within six to eight minutes. A rather alarming ventricular tachycardia (*Fig. 3b*) with bizarre and bidirectional complexes indicated the possible danger from a large dose of this drug. Similar experiences with epinephrine have been recorded in the literature.[12] However, the rapid and relatively sure action of this drug in ventricular asystole cannot be gainsaid, and its usefulness in Adams-Stokes' subcutaneously, intravenously, and intracardially has been recorded.[12 13 14] Epinephrine is, therefore, the drug of choice in an emer-

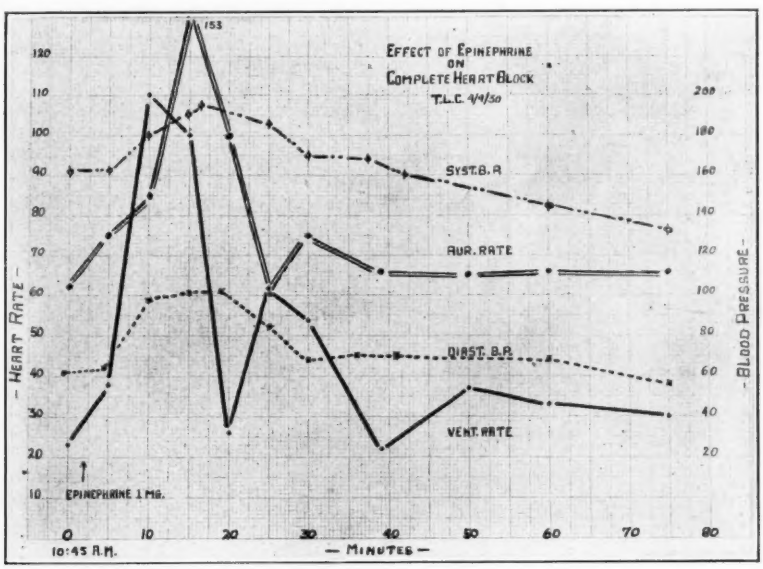

Fig. 3-a
Clinical case of complete heart block, epinephrine effect.

gency. The relatively slow action of ephedrine and the fact that large doses depress heart muscle make the intravenous or intracardiac use of this drug inadvisable.[1]

Case 2 is an instance in which Adams-Stokes' syndrome developed during the transition from a lower to a higher grade of block. In such a case spontaneous recovery is less likely to occur and the seizures are difficult to control. This patient obtained relief from a dosage of 24 mg. of ephedrine twice daily. There was no evidence that the drug improved conduction; in fact, a higher grade of block developed during the period of drug administration. In spite of this the patient remained practically free from seizures over a period of six months up to the time of her death. Fatal syncope was not prevented by ephedrine nor was ventricular standstill alleviated by intracardiac epinephrine.

While *Case 3* did not have Adams-Stokes' syndrome, she experienced relief from ephedrine, and the drug has been continued regularly at her request. The improvement here may be attributed to a slight increase in ventricular rate with partial disappearance of a very annoying bigeminy.

Dr. Paul White has been kind enough to write me his experience with ephedrine in two cases of high grade heart block:

"As for ephedrine in heart block, we have had success recently in two well-marked cases of high grade, generally complete, block, both elderly people, one a woman of 82 who has been free from Adams Stokes' attacks and sinking spells since she has been on the ephedrine. She shows a steady heart rate in the low thirties, and has complete block. It is barely possible that the block has evolved along with the administration of ephedrine. When she does not take the ephedrine, however, she does not feel so well and has some queer sensations associated with a slowing of her pulse. The other case is a man in the sixties who has had high grade block generally complete with ventricular rate of 35 to 45 with Adams-Stokes' attacks two or three years ago, but recently he has been in good health although very nervous and worried about himself. He takes ephedrine three or four times daily, ½ grain, and no other medicine, although we have a standing p. r. n. order for adrenaline or synephrin. Barium chloride he has dropped. It gave him a bad taste in the mouth and did not prove so effective as ephedrine."

Aside from transient nervousness, untoward reactions have not followed the doses of ephedrine administered to our patients. We have been careful to avoid the use of this drug in combination with digitalis.[16] Otherwise, no special method of procedure has been followed. An oral ration of 24 mg. twice daily has been found sufficient to prevent Adams-Stokes' syndrome in our two patients.

Like epinephrine,[15] ephedrine may prevent ventricular asystole without an increase in ventricular rate. Prolonged administration of this drug to three patients with heart block has not changed the grade of block, nor has it brought about sustained changes in pulse rate or blood pressure.

I am indebted to the Department of Physiology and the Department of Pharmacology of the University of Virginia for their generous cooperation and help.

CONCLUSIONS

Ephedrine has been successfully used to control Adams-Stokes' syndrome. A prolonged action and adaptability to oral administration make ephedrine particularly suitable for continued daily use.

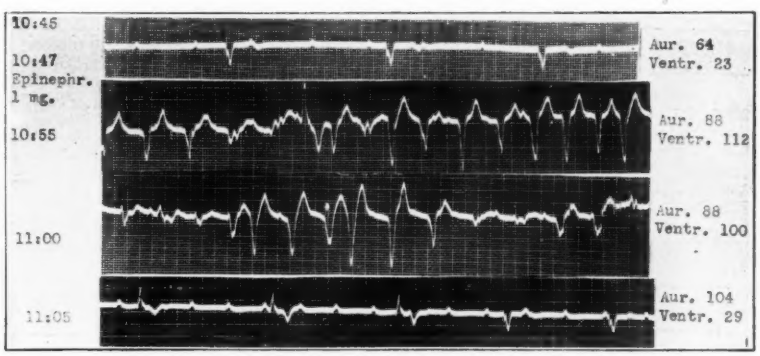

Fig. 3-b
Clinical case of complete heart block, epinephrine effect.

Epinephrine is the drug of choice in the emergency of extended ventricular standstill. Its transient effect calls for subsequent support from ephedrine.

Epinephrine in large dosage may cause dangerous ventricular tachycardia.

Case 1.—Mr. T. L. C.: *Complete Heart Block With Severe Adams-Stokes' Syndrome.*—A rural mail carrier, forty-eight years of age, was admitted to the Out Patient Department of the University Hospital May 29, 1929. His chief complaint was weakness and some shortness of breath. He was aware of the slow pulse, but had not experienced syncope up to the time of first examination. Twenty-eight observations over a period of twenty nine months have contributed to an accurate study of the symptomatology of this patient.

June 1, 1929, the patient fell unconscious. Recovery was fairly prompt. This was his first Adams-Stokes' attack. Barium chloride was administered regularly in doses varying from 30 to 160 mg. daily over a period of nine months, but the attacks gradually grew more frequent. After nearly a year a shower of severe seizures completely incapacitated the patient, and he was admitted to the hospital April 8, 1930. For three weeks previous to this date he had experienced numerous "spells" and had given up work. He would frequently fall back in syncope after making as many as five attempts to get out of a chair.

During the twenty-four hours after admission to the hospital, numerous Adams-Stokes' attacks were observed. Severe seizures were accompanied by a sudden loss of consciousness, slight but definite cyanosis, some twitching of the face and limbs, and rather prompt recovery within two or three minutes. Long ventricular diastolic pauses were noted at these times both on physical and electrocardiographic examination. Numerous less severe attacks with transient losses of consciousness were also seen. Following the continued administration of ephedrine the Adams-Stokes' syndrome completely disappeared over an eighteen-month period. At one time when the patient was unable to procure the drug for four days an enforced control period resulted. Minor attacks began within thirty-six hours and continued until relieved by ephedrine.

On initial physical examination there were no striking deviations from the normal with the exception of the circulatory system. The heart was slightly, but definitely enlarged; a rough blowing systolic murmur best heard at the apex area was present over the precordium. The rhythm was slow and regular with a ventricular rate of twenty-seven. No diastolic murmurs were present. There was moderate thickening of the peripheral arteries with slight moderate retinal arteriosclerosis. There was no evidence of congestive heart failure. The knee jerks and other reflexes were present and normal. The blood pressure was 165/70.

Fluoroscopic examination and teleroentgenogram showed a prominent aortic knob and slight enlargement of the heart. G. V. 5.5 cm.; M. R. 5 cm.; M. L. 10 cm.; T. H. 26 cm.; cardiothoracic ratio 57 per cent. No calcified areas were noted in the heart shadow.

The blood Wassermann was negative on several occasions. The hemoglobin was 85 per cent and the blood smear normal. No deviation from normal occurred in a number of urinalyses.

Electrocardiograms taken at intervals have shown sometimes right bundle branch block* and sometimes the left-branch type. Transitions from the one to the other have been noted.

Case 2.—Mrs. L. L.:—*Complete Heart Block with Adams-Stokes' Syndrome.*—A housewife fifty years of age entered the hospital July 25, 1930. She complained of some shortness of breath and attacks of vertigo followed by short spells of unconsciousness. There were no convulsions accompanying these attacks, and the unconsciousness was of brief duration. These were not severe, and weakness, dyspnea, and some congestive heart failure were the outstanding symptoms and signs. On examination the heart was enlarged. (Teleroentgenogram G. V. 7.5 cm.; M. R. 5.0 cm.; M. L. 10.0 cm.; T. H. 24 cm.; cardiothoracic ratio 63 per cent. The aortic knob was quite prominent and there was marked aortic tortuosity.) At this time slight congestive heart failure was present with signs of slight pulmonary congestion, enlargement of the liver, and edema of the feet. The blood pressure was 190/100.

Wassermann tests were negative on three occasions. Several urinalyses were normal with a good specific gravity variation.

An electrocardiogram showed complete heart block (auricular rate 100, ventricular rate 45) with left bundle branch block. Several days later low grade partial block with 1.1 rhythm was recorded. In this tracing the QRS complexes were smooth with left axis deviation. This rhythm was at times disturbed by numerous ventricular ectopic beats frequently coupled and bidirectional in nature.

A diagnosis of hypertensive and arteriosclerotic heart disease was made, and the patient allowed to return home on a regime of rest, fluid restriction, and occasional use of the xanthine diuretics. It was not considered necessary to attempt treatment of the mild Adams-Stokes' syndrome.

April 3, 1930, the patient was again admitted to the hospital complaining of a sharp increase in the number of "fainting spells." At times she had as many as six attacks daily. Again, she remained free from seizures for two weeks.

Congestive heart failure had disappeared, but otherwise the physical signs were unchanged. Blood pressure varied from 185/110 to 236/150.

Electrocardiograms again showed low grade block with prolonged PR interval and 1:1 rhythm. This was replaced by 2:1 block with runs of ventricular bigeminy. All tracings showed a marked left axis deviation with smooth QRS complexes of relatively normal duration. On one occasion complete heart block supervened. During this period of complete dissociation the patient received 48 mg. of ephedrine subcutaneously, and repeated electrocardiographic observations were made. The auricular rate rose from 100 to 130 within fifteen minutes, and the ventricular rate from 42 to 50 within twenty-five minutes after ephedrine administration. Forty-seven minutes after the drug was given the rhythm changed from complete to 2:1 block, but in view of previous spontaneous changes of rhythm no action on the conductive system could be definitely ascribed to ephedrine.

Ephedrine was continued in the dosage of 24 mg. twice daily. Some nervousness appeared for two days, but

*In this and subsequent references to bundle branch block the "old terminology" has been used.

after that there were no untoward symptoms. Repeated ephedrine administration did not raise the blood pressure level.

Attacks of syncope then became rare, and within a week had disappeared. June 3, 1931, the patient wrote for a further supply of ephedrine stating that she had been free from "fainting spells." July 15, 1931, she was still quite free from Adams-Stokes' attacks. Six weeks had gone by without a recurrence. Over that entire period the ephedrine had been continued in the same dosage without unfavorable symptoms.

The patient reentered the hospital on September 30, 1931, after having had only one Adams Stokes' seizure since July 15. This occurred after a strenuous day entertaining friends, seventy-two hours prior to admission. She complained of weakness, slow pulse, "jerking" of the heart and she had lost twenty-three pounds in nine months. On her return to us the usual ephedrine dosage was omitted for a day with a view to establishing a control period. An electrocardiogram showed complete heart block and right bundle branch block for the first time. The auricular rate was 100 and the ventricular rate 42. Blood pressure was lower than usual, 180/110. There was no evidence of congestive heart failure. Aberration of the QRS complexes had markedly increased over the last observation. Occasional smooth complexes of relatively normal duration again suggesting the possibility of two ventricular pace makers, one in each bundle branch as in *Case 1*.

At an early hour the morning following admission the patient had an attack of unconsciousness which lasted approximately thirty seconds. Recovery was spontaneous. Ephedrine was given an hour and twenty-five minutes later, with a view of preventing further attacks. Fifteen minutes after this the patient became unconscious, cyanotic, and pulseless. Neither intravenous or intracardiac epinephrine revived her.

Case 3.—Mrs. J. C. R.:—*Complete Heart Block.*—Initially it was our purpose to study the effect of ephedrine on this instance of complete heart block. The incidental relief of certain symptoms led to continued use of the drug.

A housewife, thirty-nine years of age, came in for study. At sixteen she had had an attack of "quinzy" followed by inflammatory rheumatism. According to the history a slow pulse preceded and followed this attack, but a diagnosis of complete heart block was not established until August, 1929, when electrocardiogram showed complete dissociation. The heart was markedly enlarged to physical examination and by roentgen ray observation. (Teleroentgenogram, G. V. 6.0 cm.; M. R. 7.0 cm.; M. L. 8.5 cm.; T. H. 22.5 cm.; cardiothoracic ratio 68 per cent.) There were no other cardiac signs with the exception of a slow pulse and an inconstant rough systolic murmur heard best at the apex of the heart. Blood pressure varied from 140/90 to 165/100. Frequently the patient complained of a "double beat" which was explained by the appearance of a bigeminy. Considerable apprehension accompanied the long pauses between the coupled beats.

There was no history of venereal disease, and numerous Wassermann reactions were reported as negative. A moderately severe anemia (red blood cells 3,000,000, hemoglobin 55 per cent) had evidently been present for some time. This responded poorly to treatment, and transfusion was resorted to on one occasion.

April 16, 1931, the patient returned to the hospital at our request. Electrocardiogram showed complete heart block, auricular rate 80, ventricular rate 32. Runs of coupled rhythm were frequent, due to a regularly recurring ventricular ectopic beat. In this and other electrocardiograms intraventricular conduction was normal, and no "aberration" appeared except in the ectopic beats.

Following a small subcutaneous injection of ephedrine (32 mg.) the ventricular rate rose from 30 to 38 within thirty minutes, and with this increase the bigeminy disappeared. During the same period the auricular rate dropped from 89 to 66, a fact with no satisfactory explanation. Although the increase in ventricular rate was slight, considerable subjective improvement was noted. This seemed to be largely due to the disappearance of the bigeminy at the height of the ephedrine action. Subsequently, a similar increase in ventricular rate was observed following an oral dose of 72 mg. of ephedrine.

Under continued oral dosage of ephedrine 24 mg. twice daily the patient has experienced further symptomatic improvement.

June, 1931, a letter from the patient requested a further supply of ephedrine. She has continued the same dosage of 24 mg. twice daily, and states that she is stronger and less susceptible to the periods of apprehension previously described. Her physician reports that the pulse rate averages four to five beats faster under ephedrine.

REFERENCES

1. Chen, K. K.: and Schmidt, Carl F.: Ephedrine and Related Substances. Medicine, 9:1-119, Feb., 1930.
2. La Barre: cited from Chen and Schmidt.
3. Hollingsworth, M.: Ephedrine in Adams-Stokes Syndrome. Calif. and West. Med., 26:802, June, 1927.
4. Stecher, R. M.: A Note on Adams-Stokes Disease Treated with Ephedrine. Amer. Heart Jour., 3:567-573, June, 1928.
5. Parade, G. W.; and Voit, K.: Epinephrine and Ephetonin Treatment of Adams-Stokes Disease. Deutsche Med. Wchnschr., 55:179, Feb., 1929.
6. Parade, G. W.; and Voit, K.: Pathology and Therapy of Adams-Stokes Disease. Deutsche Med. Wchnschr., 57:611-658, April, 1931.
7. Cohn, A. E.; and Levine, S. A.: The Beneficial Results of Barium Chloride on Adams-Stokes Disease. Arch., Int. Med., 36:1, 1925.
8. Herrmann, G. R.; and Ashman, R.: Heart Block with and Without Convulsive Syncope. Amer. Heart Jour., 1:269-303, Feb., 1926.
9. Price, F. W.: and Nisse, B. S.: Treatment of Adams-Stokes Syndrome Due to Auriculo-Ventricular Block. Amer. Heart Jour., 5:197-212, Dec., 1929.
10. Parsonnet, A. E.; and Hyman, A. S.: Barium Chloride in the Stokes-Adams Syndrome of Complete Heart Block: Negative Results in Eight Cases. Amer. Jour. Med. Sci., 180: 356, Sept., 1930.
11. Heard, J. D.: Marshall, W. R.; and Adams, F. S.: Heart Block with Convulsive Syncope: Case Report and Pathological Findings in Patient Unsuccessfully Treated with Barium Chloride. Amer. Heart Jour., 2:562, 1927.
12. Phear, A. G.; and Parkinson, J. W.: Adrenalin in the Stokes-Adams Syndrome. Lancet, 1:933-936, 1922.
13. Feil, H.: The Use of Epinephrine in the Stokes-Adams Syndrome. J.A.M.A., 80:26-28, 1923.
14. Levine, S. A.: The Treatment of the Attacks of Syncope Occurring in Adams-Stokes Disease. Boston Med. & Surg. Jour., 195:1147-1149, Dec. 16, 1926.
15. Parkinson, J. W.; and Bain, C. W. Curtis: The Adrenalin Treatment of Stokes-Adams Attacks. Lancet, 2:311-313, 1924.
16. Johnson, C. A.; and Gilbert, N. C.: The Combined Use of Digitalis Bodies and Ephedrine Hydrochloride: Effect on the Unanesthetized Dog. J.A.M.A., 96:1668, May 16, 1931.

Discussion follows paper of Dr. Herrmann, page 938.

SOME BLOOD CHEMICAL FINDINGS IN CONGESTIVE HEART FAILURE BEFORE AND AFTER TREATMENT*

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WITH THE TECHNICAL ASSISTANCE OF EDNA SEELIGER GOUAUX AND DOROTHY ISABELL DRAWE.

Any inquiry into the optimal conditions under which therapeutic measures act most successfully is intriguing to the clinical investigator. This is especially so in the matter of the mechanism of edema of congestive heart failure and its relief by rest, diuretics and digitalization. Edema has been the subject of many studies and much theoretical consideration in this country and abroad during the past few years. Along with edema of cardiac origin, that of certain types of nephritis, and especially that of nephrosis, has been subjected to extensive and gratifying investigation.

THE BLOOD PROTEINS

The oligoproteinemia has been conclusively shown clinically and experimentally to be the important factor in the production of the edema of nephrotics (Epstein clinically and Leiter experimentally), undernutritional states (Maver, Peters, Bulger and co-workers, Youmans and others), and pellagra (Turner).

Starling, as long ago as 1896, suggested the existence of an equilibrium between the intravascular colloid osmotic pressure which tends to draw fluid from the tissue spaces into the blood stream and the capillary blood pressure which tends to force blood plasma fluid out through the capillary wall into the tissue interstices. This idea has been revived within the last few years and greatly elaborated upon by Schade and Claussen, Govaerts, Leiter, Darrow and and Hartmann, and Christian. This colloid osmotic or oncotic pressure has been measured and shown to be directly proportional to the total blood serum protein level.

In congestive cardiac failure, edema is generally conceded to be in a large measure the result of venous stasis, increased intracapillary pressure, and consequently accelerated filtration and retarded reabsorption. That there are other factors concerned is quite evident. The exhaustive work of the Vanderbilt group has demonstrated that the buffering power of the tissue fluids is diminished with a diminution in potassium which is normally one of the most abundant bases in the body tissue, especially in muscle.

The blood serum proteins had not been particularly studied in patients with congestive cardiac failure, and consequently the establishment of these levels seemed to be indicated. Shortly after our study was undertaken the report of Atchley and Benedict on "Serum Electrolyte Studies in Normal and Pathological Conditions" appeared. Among their cases were three patients with heart disease and edema who showed serum protein values of 5.4, 6.8 and 6.6 before treatment and 6.0, 7.2 and 6.0 grams per 100 c. c., respectively, after diuretin and novasurol diuresis. Peters and his co-workers have made similar observations which, though previously unpublished, are recorded in "Quantitative Clinical Chemistry" by Peters and Van Slyke, 1931 (W. & W. Co., p. 679). Here in *Table 47* in the last two columns are recorded the serum protein data in heart failure. In 34 patients with edema, the values ranged from a minimum of 4.1 to a maximum of 8.6, while in 12 cases in which edema was absent the range was 5.5 to 7.1 per cent.

METHODS

We have studied the special blood chemistry of a series of patients with heart disease of various types during congestive failure with edema and after treatment with various types of diuretics, including digitalis. The total serum protein, the albumin and globulin fractions were determined by the colorimetric methods of Greenberg; the inorganic phosphate by the Gunther-Greenberg modification of the Fiske-Subbarow method; the calcium by the Clark-Collip modification of the Kramer-Tisdall method; the potassium by the Breh-Gaebler modification of the Kramer-Tisdall method and the total base by the wet ashing perchloric acid and the benzidine hydrochloride method of Fiske, adapted by Stadie and Ross.

BLOOD SERUM PROTEINS

We have accepted as normal a composite of the values recorded in the literature, namely: total serum protein 5.7 grams per 100 c. c. of serum; serum albumin 4.8 gm.; globulin 1.9 gm.

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*From the Departments of Medicine of Tulane and the University of Texas, Charity Hospital of Louisiana, and the John Sealy Hospital, Galveston.

and albumin-globulin ratio of 2.50. The normal ranges thus far established are:

T 5.60 to 7.65, A 4.20 to 5.65, G 1.32 to 2.91, and A/G 2.20 to 4.20.*

The averages of the lowest and the highest figures and their percentage variation from the normal of total serum protein, serum albumin, serum globulin, and the albumin-globulin ratio were as follows:

1. In 40 edematous hypertensive arteriosclerotic, chronic nephritic patients, the highest and lowest figures averaged:

T 5.51 (minus 17 per cent) and 6.11 (minus 8.8 per cent), A 3.38 (minus 29 per cent) and 3.82 (minus 20 per cent), G 2.13 (plus 12 per cent) and 2.64 (plus 39 per cent), the A/G 1.55 (minus 38 per cent) and 1.98 (minus 21 per cent). When free of gross edema 25 cases showed T 6.51 (minus 2.8 per cent) and 6.66 (minus 0.6 per cent), A 4.03 (minus 16 per cent) and 4.10 (minus 15 per cent), G 2.41 (plus 27 per cent) and 2.51 (plus 32 per cent, A/G 1.73 (minus 31 per cent) and 1.79 (minus 30 per cent).

2. Of 13 patients with arteriosclerotic heart disease and auricular fibrillation, 5 with edema were found to have: T 5.19 (minus 22.5 per cent) and 5.67 (minus 15 per cent), A 3.11 (minus 35 per cent) and 3.53 (minus 26 per cent), G 1.99 (plus 4.7 per cent) and 2.22 (plus 16.8 per cent), A/G 1.60 (minus 36 per cent) and 1.81 (minus 27.6 per cent). Without edema 8 showed T 6.92 (plus 3.3 per cent) and 7.54 (plus 13 per cent), A 4.27 (minus 11 per cent) and 4.61 (minus 4 per cent), G 2.69 (plus 42 per cent) and 3.08 (plus 62 per cent), A/G 1.49 (minus 40.4 per cent) and 1.91 (minus 24 per cent).

3. Among the patients with syphilitic cardiovascular disease there were 12 with aortitis, 9 of whom were edematous and presented the following values:

T 5.26 (minus 22 per cent) and 6.25 (minus 6.6 per cent), A 3.04 (minus 36.7 per cent) and 3.46 (minus 28 per cent), G 2.15 (plus 13 per cent) and 2.83 (plus 49 per cent) and A/G 1.29 (minus 48 per cent) and 1.68 (minus 33 per cent). Three series of observations in this type of patient without edema showed T 6.20 (minus 7.5 per cent) and 6.52 (minus 2.7 per cent). A 3.44 (minus 28 per cent) and 3.75 (minus 22 per cent), G 2.76 (plus 45 per cent) and 2.77 (plus 46 per cent) and A/G 1.36 (minus 46 per cent) and 1.49 (minus 40 per cent).

In 4 individuals in the absence of edema we found: T 6.7 (minus 7.9 per cent) and 6.72 (plus 0.3 per cent), A 3.82 (minus 20 per cent) and 4.30 (minus 10 per cent), G 2.29 (plus 21 per cent) and 2.48 (plus 31 per cent) and A/G 1.57 (minus 37 per cent) and 1.87 (minus 25 per cent).

Of fourteen syphilitics with aortic regurgitation, 10 with congestive failure and edema, showed: T 5.36 (minus 20 per cent) and 6.00 (minus 10.4 per cent), A 3.16 (minus 34 per cent) and 3.48 (minus 28 per cent), G 2.60 (plus 37 per cent) and 2.15 (plus 13 per cent), A/G 1.34 (minus 46 per cent) and 1.58 (minus 36.8 per cent).

4. Only 9 studies were made in patients with rheumatic mitral stenosis. In three examinations from patients with dependent edema the values obtained were: T 5.44 (minus 19 per cent) and 6.67 (minus 0.4 per cent), A 3.29 (minus 31 per cent) and 3.52 (minus 27 per cent), G 2.12 (plus 12 per cent) and 2.58 (plus 35.8 per cent) and A/G 1.41 (minus 44 per cent) and 1.64 (minus 34 per cent).

In six analyses of blood from patients of this type taken in the absence of peripheral edema the levels were found to be: T 6.10 (minus 9 per cent) and 6.87 (plus 2.5 per cent), A 3.86 (minus 20 per cent) and 4.46 (minus 7 per cent), G 2.21 (plus 16 per cent) and 2.44 (plus 28 per cent) and A/G 1.71 (minus 31.6 per cent) and 1.98 (minus 21 per cent).

COMMENTS

In summary these data on the serum proteins indicate that in patients with congestive heart failure and edema there are slightly lowered blood serum protein levels. The slight oligoproteinemia was slightly more marked in those with syphilitic heart disease and congestive failure and persisted in these longer after the disappearance of the edema. In general, however, the type of heart disease that was present made little or no difference in the level to which the serum proteins were lowered. The albumin fraction was the one that had suffered the greatest loss, while the globulin concentration had increased in an apparently attempted compensatory way. This was the case not only during the failure period, but the rise continued most conspicuously after the edema disappeared.

The explanation of the lowered blood proteins, and especially the lowered serum albumin concentration, is not simple. Apparently there are several factors to be reckoned with. There is usually some loss of serum albumin through the congested kidney of heart failure, but this is not enough as a rule to account for the changes. The congested liver may be responsible for part of the diminution in that a part of its normal function may be the elaboration of all of the blood proteins as it apparently is of fibrinogen and euglobulin. The congestion may interfere with such liver function. The source of the blood proteins other than fibrinogen has not yet been established. The congestion of other organs, and especially of the stomach and gastrointestinal canal, may be directly or indirectly concerned. Absorption and elaboration of proteins may be interfered with, but what is probably of importance is that anorexia is produced, and with the decrease in the desire for heavy food, the protein intake becomes insufficient. In our charity hospital patients the severe economic stress prohibited the purchase of protein food and thus probably contributed to the pro-

*T stands for total serum protein; A for the albumin fraction; G for the globulin fraction and A/G for the albumin-globulin ratio.

tein loss. The lowered protein levels have but little influence so far as we have determined at present upon the efficacy or failure of therapeutic measures. Our study of this point, however, consists only of a superficial survey of the data and no careful attempts at correlation.

SERUM CALCIUM AND INORGANIC PHOSPHORUS

The traditional conception of the synergistic action of calcium and digitalis, both of which have a tonic effect upon the heart muscle, suggested itself to us as a subject to be investigated. The study of the calcium levels in patients with the edema of congestive heart failure before and after treatment was undertaken. We had hoped to determine the relationship of the calcium level to the effectiveness or lack of effectiveness of digitalization and other therapeutic measures. Peters and his co-workers had reported the establishment of an interrelationship between the serum calcium, inorganic phosphorus and total plasma protein levels. They evaluated the relative effects of protein and phosphorus upon serum calcium in the absence of any true defect in calcium metabolism. The relationship was defined by the equation in which the theoretical calcium level was considered to equal 7 plus 0.566 protein minus 0.255 P

(Ca=7+0.566 T.P—0.255 PO_4).

We calculated these theoretical calcium values for about a hundred of our patients and found them to parallel roughly, within about 20 per cent, the actual calcium determinations in most instances, but with occasional divergence the significance of which was in doubt. Stearns, Knowlten and Greenwald, subsequent workers, have questioned this relationship and the latter has suggested another equation (Ca=X plus 0.875 protein) X=3.7, 6 or 6.2 for infants. We have not as yet calculated the theoretical values for the calcium level in our series by the formula of Greenwald, but we hope to do this later and compare the results with those obtained by the Peters formula. We have, therefore, taken the generally accepted 10 mg. per 100 c. c. as the normal level of calcium in the blood serum and have roughly considered as high those estimations that were 11 mg. or above and as low those that were 9 mg. and under. We realize, as Aub and his group have pointed out, that the serum calcium and phosphorus do not tell the whole story of calcium and phosphorus metabolism, but we do feel that the recognized importance of calcium in cardiac physiology and water metabolism warrant this study of the levels in the serum of patients with and without the dependent edema of congestive heart failure.

THE SERUM CALCIUM AND PHOSPHORUS

The averages of the highest and the lowest calcium and phosphorus in milligrams per 100 c. c. without duplication and the number of determinations from which each of these is obtained in each of the clinical groups are as follows:

1. For the hypertension patients with edema of congestive failure the figures were: Ca highs 10.07 (48), lows 8.43 (24); PO_4 highs 3.65, lows 2.72, and C/P 3.76 highs and 2.44 lows; while after edema disappeared the figures were: Ca 10.12 (36), 8.60 (7); PO_4 3.28 and 3.18 (7); C/P 3.74 (36) and 2.43 (7).

2. Arteriosclerotics with auricular fibrillation presented these averages with edema: Ca 9.44 (12) and 7.56 (7); PO_4 3.63 and 2.38; C/P 3.63 and 2.63. These patients when without edema showed: Ca 9.22 (8) and 9.57 (2); PO_4 3.13 and 1.81; C/P 3.61 and 2.56.

3. A group of patients with syphilitic aortitis, some of which also had hypertension and arteriosclerosis, were studied and gave the following results: with edema, Ca 9.95 (20) and 8.12 (12); PO_4 3.60 and 3.02; C/P 3.55 and 2.21. Without edema these gave: Ca 10.42 (16) and 7.12 (5); PO_4 2.91 and 2.71; C/P 4.32 and 2.41.

When in the syphilitics aortic regurgitation was present, slightly lower calcium levels were encountered. In the edematous ones the averages were: Ca 8.81 (10) and 7.70 (7); PO_4 3.50 and 2.77; C/P 2.91 and 2.47. In the non-edematous ones the averages were: Ca 8.96 (7) and 8.20 (1); PO_4 3.04 and 3.39; C/P 3.75 and 1.53.

In three auricular fibrillators who also had syphilis the values with edema were: Ca 10.94 (2) and 6.9 (1); PO_4 3.75 and 3.44; C/P 3.26 and 1.65 (1). Without edema the values were: Ca 9.10 (3) and 7.60 (1); PO_4 2.89 (3) and 2.99 (1); C/P 3.47 (3) and 2.09 (1).

Averaging all the syphilitics together, the edematous patients averaged: Ca 9.65 (32) and 7.91 (20); PO_4 3.54 and 2.95; C/P 3.33 and 2.28. The patients when non-edematous presented these averages: Ca 9.87 (26) and 7.35 (7); PO_4 2.94 and 2.85; C/P 4.16 and 2.23.

4. The rheumatic heart disease patients were all taken together and averaged with those with auricular fibrillation, all of which at the first observation were edematous. Some were studied later when they had become edema-free along with those of regular mechanism, none of which showed dependent edema.

Rheumatic auricular fibrillators presented: while edematous, Ca 10.80 (6) and 9.73 (3); PO_4 2.57 and 1.53; C/P 5.87 and 5.07; and when free of edema, Ca 10.20 (4) and 8.26 (3); PO_4 3.57 and 2.03; C/P 5.66 and 4.09.

In the edematous state we found the following averages: Ca 10.80 (6) and 9.73 (3); PO_4 2.57 and 1.53; C/P 5.87 and 5.07. In the absence of edema the averages were: Ca 10.54 (8) and 8.49 (5); PO_4 3.86 and 2.64; C/P 3.97 and 3.35.

All types together of cardiopaths with auricular fibrillation showed while water logged the following levels:

Ca 10.00 (20) and 8.10 (11); PO_4 3.33 and 2.24; C/P 4.27 and 3.21. When dry this type of patient presented slightly less but quite similar levels: Ca 9.88 (15) and 8.59 (6); PO_4 3.20 and 2.12; C/P 4.13 and 3.92.

COMMENT

In general we might say from these averages that heart disease in itself by and large, whether accompanied by edema or not, has apparently little influence upon the serum calcium and phosphorus levels or the relation of one of these to the other. In individual cases, however, the values of these constituents of the serum may play a definite part in the success or failure of therapeutic measures. As yet we have but uncorrelated and fragmentary evidence upon this point, some of which we will try to present presently.

CALCIUM

The ranges between the averages of the highest values obtained and the lowest values determined are remarkably narrow, but usually smaller in the non-edematous than in the edematous group. The exceptions were in instances where there were only two or three determinations for averaging. The ranges in the serum calcium averages were usually 1 to 1.5 mg., rarely 2 mg.; in inorganic phosphorus from 0.3 to 1 mg., rarely 1.5 mg. The ratios of calcium to phosphorus varied usually about one point between the average of the highest and that of the lowest figures, rarely amounting to one and a half. The calcium values averaged highest for the rheumatic group, and especially those with auricular fibrillation, the group that reacts best to digitalization, quite the opposite of what the analysis of individual cases seemed to reveal. However, the averages were but once above 11 mg., which is the upper limit of normal. The hypertension group was intermediary with averages from 10 mg. to 8.5 mg. The syphilitics averaged just below 10 mg., while those with syphilitic aortic regurgitation were found with the lowest serum calcium values of 8.96 to 7.7 mg. per 100 c. c.

PHOSPHORUS

The inorganic phosphates in the blood serum averages were lowest in the rheumatic group and highest in the syphilitics, and the ratios of calcium to phosphorus were highest in the rheumatics and lowest in the syphilitics. These findings seem to indicate some tendency to a reciprocal relationship, in spite of recent criticisms to the contrary. It is generally conceded that the calcium is present in the body practically entirely as calcium phosphate, but the concentration of either calcium or phosphorus may be affected independently. Unfortunately the metabolism of these may be disturbed without conspicuous changes in the serum values. Nevertheless, serum calcium and inorganic phosphorus concentrations and calcium and phosphorus metabolism are interrelated. The serum protein concentration, as stated above, affects the serum calcium to a fairly definite degree and must be reckoned with.

In studying the individual graphs of the serial chemical findings and clinical therapeutic response and classifying the latter as "Good," "Fair," "Poor" and "None" with digitalization and theophyllin administration, as contrasted to diuresis with mercurials such as salyrgan, we made some interesting observations. There were 18 patients with low calcium levels who were considered to have shown a good response and 3 a fair one, to digitalis, and one of the same type showed a good response to salyrgan and 5 a fair diuresis. Of those with normal calcium levels, 11 showed a good and 5 a fair response to digitalis, and 4 a good and one a fair result with salyrgan. In contrast to these are the patients with high calcium levels, only one of which could be considered to have responded well; 5 showed fair, 4 poor, and 7 no definite response, while salyrgan produced good response in 7 and a fair response in one of the 8 with high calcium levels that were so treated.

A superficial survey of our data thus seems to indicate, contrary to our expectations, that the patients with the low calcium values respond better to digitalization than do those with high blood serum calcium levels and have in general a better prognosis. A fall and persistent low level in a moderately increased calcium level, after the first application of a therapeutic measure, seemed to be a good omen. Those patients with elevated calcium levels did poorly and the outlook was generally bad, especially when there was a continuation of the rise. Two patients with high values, who had calcium administered intravenously before the hypercalcemias were reported, died promptly following the injection.

In a group of patients with arteriosclerotic heart disease and paroxysmal nocturnal dyspnea and occasionally acute pulmonary edema attacks, the higher calcium levels were almost uniformly present and persisted and the patients survived. In one with pulmonary edema, calcium was administered intravenously not only

without detriment but apparently even with improvement.

The phosphorus levels seemed to be a function of the calcium levels and no correlation has as yet been undertaken.

POTASSIUM

The potassium studies have not been numerous enough to warrant much discussion. In general, the values were found to be low, below 20 mg., in most cases of congestive failure, but low figures were also found in patients with mechanism disturbances such as premature contractions, paroxysmal tachycardia, and flutter. The administration of potassium has met with some success. The cardiac depressing effect is more probably the favorable factor, rather than the deficiency of the element, in the blood serum of the affected individual.

CONCLUSIONS

All of our observations are still incomplete and only suggestive, but seemingly they warrant further and more precise investigation along the same lines.

DISCUSSION (*Abstract*)

Papers of Dr. Wood and Dr. Herrmann.

Dr. James E. Paullin, Atlanta, Ga.—Any additional facts which can be assembled, either of positive or negative value in the study of edema, will help to a better understanding of fluid accumulation in heart failure, which at the present time cannot altogether be explained by the dynamics of the blood flow. With congestive heart failure it seems reasonable to assume, as Dr. Herrmann has done, that there might be deficient absorption of protein from the intestinal tract, deficient production of protein by the liver, as well as excessive loss of protein through kidney excretion. However, for these factors to assume a place of great importance they should exist for some time. In patients who have had cardiac failure for a short time, these factors apparently would contribute little in the mechanism of edema. Other things than loss of protein from the blood also contribute to the accumulation of fluid in the tissue. It would be quite interesting if Dr. Herrmann in the further pursuit of his study would also investigate the tissue fluid, comparing its chemical composition with that of the blood in patients during the early and late stages of congestive failure.

Dr. Wood's paper gives us very interesting observations on the effect of ephedrine in patients with heart block. I am able to confirm his results with the use of this drug in an elderly individual with complete heart block and with Adams-Stokes' attacks. Since the daily administration of ephedrine by mouth, this patient has not had an Adams-Stokes' attack, yet there has been no change in the pulse rate, blood pressure, or the electrocardiogram since taking this drug. Experimentally ephedrine should not be of much benefit in this type of individual. Clinically it is of value.

Dr. C. Sidney Burwell, Nashville, Tenn.—Heart disease might be prevented if we knew how to prevent or control the conditions that cause it. We have not this knowledge in effective form. Even without this knowledge, death and disability from heart disease might be postponed if we knew better how to control cardiac failure. We have some abi'ity to control cardiac failure and for certain periods of time in almost every case we get relief from its symptoms. Soon, however, we reach a stage where measures at first effective cease to be so and our patients die of heart failure.

Dr. Herrmann reports here enough cases with suggestively low protein levels to emphasize the possibility that this may be a contributing factor to the edema. A moral goes with this, namely, that the limitation of protein is distinctly a two-edged sword with which to play. I am sure we often overdo our limitation of protein intake and that some of the symptoms of the late stages of heart failure are directly due to our attempts at dietary therapeutics. Of course many patients with cardiac failure have poor appetites and are not inclined to eat anything.

Dr. Wood's paper seems to me to present a number of interesting points. I should like to emphasize that the therapeutic problem of heart block is not the block itself. Most people with a complete heart block and with ventricular rates from 28-35 get along extraordinarily well. To our surprise they do not develop heart failure early. Many of them live for years with comfort and are able to live constructive and enjoyable lives. The danger to which they are subject is the danger of sudden heart attacks associated with the sudden slowing of the rate below its already low level. Thus, drugs which influence ventricular rate come very near to answering this central problem of the treatment of heart block. These drugs include barium chloride, suprarenalin and ephedrine. As Dr. Wood has pointed out, ephedrine appears to have certain advantages over suprarenalin.

I do not think it surprising that these patients obtain relief without any increase in the general level of their pulse rates. They do not suffer from a generally reduced pulse level but from an occasional extreme reduction.

Dr. O. S. Warr, Memphis, Tenn.—Fortunately for us as clinicians, heart block, especially the Adams-Stokes' syndrome, is not a common phenomenon. A case which I have recently observed failed to be benefited by adrenalin.

In another, following ten days of treatment with desiccated thyroid, one grain three times a day, the heart block had entirely disappeared. After a later attack thyroid was without effect. He was then given ephedrine sulphate, three-fourths grain three times a day, but had not improved at the end of one week.

Dr. William B. Porter, Richmond, Va.—Dr. Wood's observations upon the effects of suprarenalin chloride upon the ventricular musculature indicate that this substance may be of real danger, especially if used in patients with diminished coronary blood flow. It has been recently suggested that suprarenalin chloride might be

used in the diagnosis of angina pectoris. My feeling is that this procedure is fraught with much danger. Ventricular tachycardia is easily produced when the coronary blood flow is reduced, and it is conceivable and reasonable to fear the induction of ventricular fibrillation with suprarenalin chloride in patients having angina pectoris.

Dr. Burwell's comment on the importance of the dietetic factor in the production of edema is timely. It has a bearing also upon the problem of hydrostatic edema associated with congestive heart failure.

During economic strain the tendency of the individual is to switch to a high carbohydrate diet; such food is cheaper and has a high energy producing factor. We have recently been impressed by a group of patients with congestive heart failure and normal rhythms who promptly and completely recovered upon an adequate diet.

Dr. Randolph Lyons, New Orleans, La.—I would like to report the fact that in 1926 I had a patient, a man over sixty years of age, who had a complete heart block. At that time I tried various remedies such as barium chloride, atropine, thyroid, digitalis, without success and finally hit upon ephedrine. Dr. Herrmann was associated with me in this case. The patient under the administration of ephedrine improved and lived a year and three-quarters. In the beginning he had very mild attacks of Adams-Stokes' syndrome. The ephedrine appeared to increase the ventricular rate and his sense of well being, but did not break the block. This only occurred once under the influence of digitalis, but could not be produced a second time with the same drug.

Naturally we were interested to see what the effect of ephedrine would be upon the blood pressure. From numerous readings we found that ephedrine had a tendency to increase the blood pressure after this patient had been on it for some months. The blood pressure rose gradually from 140 systolic to 190 systolic. At this time the patient went to Clifton Springs and I had a report from Dr. Wedd that his blood pressure had jumped to over 200 systolic and that the ephedrine was stopped for the time being. The patient finally died in an Adams-Stokes' attack. The blood pressure during the last week of his life was over 200. An autopsy, however, showed extensive degenerative changes in his kidneys as well as arteriosclerotic changes in the heart muscle, coronaries, mitral and aortic valves. It is, therefore, possible that the gradual rise of blood pressure was not necessarily due to the ephedrine, but to his cardiorenal disease.

For the Adams-Stokes' attacks, there is nothing at present that takes the place of adrenalin chlorid. In this particular instance, the patient was almost miraculously brought back to life by its intravenous use on two different occasions. Finally, my limited experience with ephedrine in heart block is in accord with Dr. Wood's observations as to its beneficial effects.

Dr. E. Sterling Nichol, Miami, Fla.—One of my patients with Adams-Stokes' syndrome associated with attacks of ventricular tachycardia over a number of months received a total of 80 grams of barium chloride, which I believe is the largest total dose reported in the use of this drug. Curiously enough the ventricular tachycardia disappeared as well as the attacks of fainting which this patient experienced. It was certainly apparent that if barium chloride had the property of stimulating the autonomic centers of the ventricle, the attacks of ventricular tachycardia which this patient had been experiencing would hardly have cleared up under such large doses of barium chloride. Additional doubt has been thrown on the reaction of barium chloride by recent reports such as those of Hyman, showing that the drug is of little value in the treatment of heart block. Probably the patient which I exhibited as an Adams-Stokes' syndrome did not have true heart block, but simply fainted at the point of her change in ventricular rate from a normal rate to ventricular tachycardia.

I think it is generally agreed that ephedrine is the drug of choice for the treatment of Adams-Stokes' syndrome or heart block.

Dr. Wood (closing).—Generally speaking, it would seem wise to use the minimal effective dose of ephedrine in cases of Adams-Stokes' syndrome. This, in our experience, has been 24 mg. two or three times a day.

The failure of ephedrine to prevent exprimental asphyxial heart block in cats can hardly be attributed to amytal anesthesia as it seems unlikely that ephedrine would produce a blood pressure rise and then fail in its action elsewhere. Further, we had a decerebrate animal that had no anesthesia, and the same reactions were obtained in this case as in the ones described above. It seems clear that ephedrine will not prevent asphyxial heart block in cats, and it seems probable that suprarenalin has some action upon the conduction system. Numerous experiments will be necessary to establish fully this difference in the drugs. In the case of the perfused turtle hearts, anesthesia of course does not enter into the problem, and in this instance suprarenalin lifted quinidine block whereas ephedrine failed to do so. This experiment again demonstrates that there is a very distinct difference between the action of the two drugs.

Both clinical and experimental observations indicate that suprarenalin injected in large doses may produce ventricular tachycardia or even ventricular fibrillation, and we therefore agree with Dr. Porter that the use of suprarenalin as a diagnostic test for angina pectoris may be a dangerous practice.

Dr. Herrmann (closing).—We have examined the pleural and ascitic fluid as we'l as the blood of only a few patients, and have nothing definite to report as yet. We shall probably undertake further studies of that type later on and even hope to study the fluid drained by Southey tubes.

Concerning the diet of these patients, I am ready to admit an inadequacy in the protein allowance. This is, I think, perhaps one factor in producing oligoproteinemia. The anorexia, however, whether it be due to the congestive failure or digitalis, is another and the gastrointestinal congestion still another factor that leads to the curtailment of the intake or absorption of protein. One point that I want to bring out is that our routine regime may be at fault and affords the possibility of the development of a secondary feature. These patients that we studied were routinely placed upon a low protein, and as nearly as possible salt-free diet, as soon as they were admitted to the hospital with edema. It may be that just that routine prescription aggravates the situation and sometimes produces the conditions for the failure of response to therapeutic agents used in the treatment of edema.

OBSCURE FEVER*

By BENJAMIN BASHINSKI, M.D.,
Macon, Ga.

One often wonders why some of our text-book writers have not grouped the most important diseases or conditions under one head: "Obscure Elevation of Temperature."

Of course one cannot group together all conditions that cause obscure rise in temperature, as the list would be entirely too long. I have in mind those which are most commonly encountered.

I am sure that I voice the opinion of most pediatricians when I make the statement that obscure temperature elevation is the cause of the majority of referred cases. The cases are not diagnosed because of a superficial examination and lack of laboratory facilities, or failure to use these facilities.

None of us should depend solely upon the laboratory for our diagnosis, but at the same time it is most essential that we use laboratory facilities in making our diagnoses in the majority of obscure fevers. A routine examination of the urine will, in many cases, clear the diagnosis. This examination should be made in every case that comes under our care, regardless of the history obtained. A complete examination is impossible without the use of the otoscope; and no examination can possibly be called complete unless the patient is entirely nude.

One may say that in practically all of the contagious diseases, especially the exanthemata, fever is the only symptom for a few days, depending upon the incubation period. The diseases most commonly encountered which cause an elevation of temperature are the following: pyelitis, malaria, tuberculosis, typhoid and paratyphoid, influenza, sinusitis, and abscessed teeth.

I have placed pyelitis at the head of the list because in my opinion this is the commonest cause of obscure rise in temperature in infancy and childhood. No condition is overlooked so often, especially by the general practitioners.

It seems easy to give the helpless babies either calomel or castor oil in every case of elevation of temperature and after this violent treatment, or after repeated doses, to be surprised that the fever still persists. The laboratory is indispensable for diagnosis in the majority of cases.

We have a patient for a complete physical examination. The only positive finding is fever. The otoscope has ruled out otitis media and in this connection I want to make the statement that pain is not a constant symptom in otitis media. Otitis media occurs under many conditions, especially as a complication of measles, and one will occasionally see an ear drum that has an egg-white color, very thick, often causing fever of several days' duration without the slightest degree of pain. After a paracentesis the ear will discharge as freely as an acute otitis. Fever is not a dependable symptom in otitis. In many cases of otitis media in infancy, one finds violent nausea and vomiting among the symptoms. It is most important that the ears be cleansed properly before using the otoscope, because an ear canal packed with wax may give a false diagnosis.

A total white count will aid in differentiating pyelitis, malaria, tuberculosis, typhoid, paratyphoid, influenza, sinusitis, and abscessed teeth.

A leucocytosis will rule out malaria, tuberculosis, typhoid, paratyphoid and influenza if they are uncomplicated and we are dealing with acute conditions. These diseases will show a leucopenia, leaving us pyelitis, sinusitis and abscessed teeth to consider. The only form of tuberculosis that will give a leucocytosis is tuberculous meningitis, or pneumonia.

A complete urinalysis (and we mean by this both chemical and microscopical) will give us the diagnosis of pyelitis. In this connection I may say that one negative examination of the urine should not rule out pyelitis, as quite often pus does not show in one examination, due to blocking of the ureters or some other cause. An uncentrifuged specimen is very reliable. Again, we find these little patients having two and often three chills daily. In this connection I should like to say that the infant does not have a rigor with the chill, but the rigor is replaced by cyanosis, especially noted around the lips, finger and toe nails. This has seemed to be confusing to some of the general practitioners.

Malaria in our section is found in the very young. In fact, I have in my records two cases of malaria in infants, one where symptoms appeared on the twelfth day and one on the tenth day after birth. Both of these cases were proven

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by the laboratory and both were of the tertian variety. In both cases the mothers were found to be positive.

Quite often we are unable to demonstrate parasites in one examination of a stained specimen of the blood, and one negative examination should not cause us to make a negative diagnosis. At least twelve slides should be examined before making a negative diagnosis. If we are unable to find the parasites, a leucopenia with a large increase in the small lymphocytes and stippling will help us diagnose the case if other findings are in keeping. One of the most constant symptoms of malaria in the very young is an associated diarrhea which will subside under the proper malarial treatment. Again, every case of acute malaria does not show a splenic enlargement, and every case of splenic enlargement is not malaria, as some think.

Pulmonary tuberculosis in infancy and childhood is not found so often as glandular tuberculosis. The tracheobronchial glands are more often the center of foci, but the cervical glands are quite often involved. As a rule, in the low grade fevers, one would not err should he rule out every other cause before considering tuberculosis. It is not so common as supposed, even though many mothers have been taught that every child with a low grade temperature has tuberculosis. Ghon, in his wonderful book, states (and it has been proven by autopsy) that in every case of infected tracheobronchial glands there is a corresponding area of pulmonary tuberculosis on the affected side. The von Pirquet test is helpful, but is of greatest importance in the very young.

Typhoid fever in infants and the very young cannot be diagnosed with any degree of certainty from the symptoms alone. The Widal is very unreliable. Possibly the most certain laboratory test is the isolation of the typhoid bacilli from the urine or stools. We have had two cases on our service, one at nine months and one at ten months of age. Both were fatal and both were autopsied with the positive diagnosis of typhoid fever. You will always find that the younger the patient the more sudden the onset. At times, because of the acute abdominal pain, one will be confused. The pain may simulate appendicitis, but a leucocyte count will help us in this difficulty.

Influenza may be easy to diagnose during an epidemic, but at other times it is not easy. Infants are not immune to this disease and in them it runs a more severe course than in older children. Practically every uncomplicated case will show a leucopenia. Many cases are ushered in with a convulsion, which at times resembles meningitis.

Many persons have an idea that the deciduous teeth are not important and that alveolar abscesses do not occur. We find these abscesses either in the acute or chronic form, with or without pain. Pus may be discharged, but at the same time may become caseous. In many cases of obscure fever an x-ray of the teeth is of vital importance. Often we find the diagnosis here. Dry abscesses which become caseous are latent and do not cause pain. Drainage is very necessary and after this procedure the low grade elevation of temperature will disappear.

Last, but by no means least, is the question of sinusitis in infants and children. This is without a single doubt one of the most common causes of obscure fever. Many believe that infants and very young children are immune to this condition. Disease of the maxillary antrum is found very often in the young.

Only last month I had a patient of six years of age coming to my office with the history of fever ranging from 99 to 100° for three weeks. Physical examination was negative. He had no pain of any description. The blood count was 17,400. X-ray of the sinuses showed clouding of the left antrums. He was referred to the otolaryngologist and pus was demonstrated by antrum puncture

I have also in my records a case of like character only four weeks of age. If our examinations are thorough we shall find sinusitis in infants. For years we were taught that all accessory sinuses in childhood were rather rudimentary, but this is not borne out by actual experience in the operating or autopsy room. Many factors contribute to sinusitis, such as: influenza, pneumonia, scarlet fever and measles, especially influenza. Profuse nasal discharges, especially postnasal dripping, should make one suspicious of sinusitis. Repeated hoarseness is another symptom.

We lay much stress upon tonsils and adenoids, especially the infected adenoids, as causing otitis media, but if we were more careful in our examination we should find that infected sinuses are often to blame. How often are we disappointed when, after the removal of the adenoids, our little patients continue to have otitis media. It was not caused by the adenoids, but by sinus infection. Adenoids is not the only condition

which causes mouth breathing, as infected sinuses will do the same. Let us resort more to the x-ray, trans-illumination, the nasal speculum and in every examination a tongue depressor.

DISCUSSION (*Abstract*)

Dr. Charles J. Bloom, New Orleans, La.—In pyelitis, at times the examination of the urine does not reveal pus. In those cases in which I suspect pyelitis I have instructed the parent to keep for me a twenty-four-hour specimen. Very often a case which previously had not been verified is thus proven positive.

I, too, until recent years have held the belief that sinusitis is a rather uncommon condition in children. Frontal sinusitis is most uncommon. Ethmoidal and sphenoidal sinusitis are infrequently seen, but maxillary sinusitis is extremely common. I have seen sinusitis in children under two years of age. Signs of sinusitis are restless nights, vomiting in the morning, and difficulty in breathing, present only at dusk.

I recall hearing several years ago in St. Louis a very splendid paper by Dr. Fleischner, who has since died, dividing adenopathies into two groups: the tuberculous, on the one hand, and the non-tuberculous. The non-tuberculous adenopathies may give us only fever of unknown origin. Among the commonest non-tuberculous infections, this picture is presented following acute infectious diseases and also is seen in a great many cases of the so-called secondary anemias. Non-tuberculous adenopathy of the chest is one of the commonest causes of fever of unknown origin.

I should like to add two other causes of fever of unknown origin. We may make an examination of the throat and find that the child has a submerged tonsil. If we use an increased amount of pressure on the tongue, the child will attempt to swallow, and in swallowing the tonsils will have a tendency to go together and the superior surface of the tonsil will be partially viewed. I have found in a great many cases a follicle on the superior surface of the tonsil that has been responsible for fever of unknown origin. Last but not least, in a series of about 200 cases of chronic appendicitis of children, I have found fever of unknown origin in about 8 to 10 per cent.

Dr. Hughes Kennedy, Jr., Birmingham, Ala.—Exanthem subitum should be mentioned as a cause of obscure temperature rises. Translated, it means an unexpected rash. The child, usually between six months and three years of age, presents a temperature between 101 and 104°. There are no symptoms and the child rarely seems very ill. On about the fourth day, the temperature falls to normal, almost by crisis. A few hours later, a macular rash appears on the body that closely resembles, and is frequently mistaken for, measles. However, there is no coryza, cough or conjunctivitis and there are no Koplik spots. The child also seems well when the rash appears instead of being sicker as with measles. During the course of the disease the only clues as to its identity are a leucopenia and an absence of symptoms. There are no complications.

Dr. Bashinski (closing).—On Friday of last week I saw a child three and a half years of age with a history of low grade fever for six months. He had had all kinds of tests and had had an x-ray examination of the chest with negative results. He had a constant nasal discharge. We x-rayed his sinuses and both antrums were filled with pus. We drained them, of course, and the fever immediately disappeared. It became normal for the first time in three months.

ACUTE APPENDICITIS IN CHILDHOOD*

By HUGHES KENNEDY, JR., M.D., F.A.A.P.,
Birmingham, Ala.

When beginning the practice of medicine, my first office patient was a child, four and one-half years of age, presenting a ruptured appendix with general peritonitis. He had been sick for four days with symptoms typical of acute appendicitis. He had had calomel and castor oil, and, the day previous, the family physician had rolled him on the floor in an endeavor to reduce the abdominal distention. This case forcibly impressed upon me the fact that acute appendicitis may go undiagnosed merely because it is not considered as a possibility. Surely the above case would have been correctly interpreted if the physician had once thought of this disease.

We like to pride ourselves upon the thought that medicine is making great progress and that a diseased individual of today has a more hopeful outlook than thirty years ago. When we look at the figures upon acute appendicitis we must lose some of our cockiness. In 1900 the death rate for acute appendicitis was 9.7 per 100,000 population, while in 1929 it was 15.2. I am sure that all of this increase was not due to more accurate diagnoses, nor was the increase due to poor surgery. Delayed diagnosis must receive the blame.

In 1929, there were 17,687 deaths in the Registration Area of the United States attributed to acute appendicitis. When you learn that of this number 916 were under five years of age and that another 1,388 were five to nine, inclusive, you will realize that acute appendicitis is an important disease of childhood. Three authentic cases have been reported in infants forty, forty-one, and fifty-five hours old.

Symptomatology.—If a satisfactory history can be obtained, the order of symptoms is usually the same as in adults, that is, generalized abdominal pain, particularly in the epigastrium, then nausea and vomiting, followed by tender-

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ness and paroxysmal pain in the right lower quadrant. While diarrhea may occur, constipation is more frequently found and may be quite marked.

Diagnosis.—The chief difficulty in diagnosing juvenile appendicitis is the fact that both mother and child universally consider the abdomen the most important region of the body. If a ten-day-old baby whimpers, the mother is sure of the stomachache. We all see numerous children with extra-abdominal lesions with the child referring the pain to the umbilical region. Some time ago, a seven-year-old child was seen with abdominal pain, nausea and vomiting. The temperature was 101°. His abdomen was negative, but both tonsils were covered with a diphtheritic membrane. Throughout the entire course of the disease the pain was always referred to the umbilicus and never once did he complain of a sore throat.

The physician is likely to become calloused to the constant finding of abdominal symptoms, regardless of the disease, but he must ever be on his guard to pick out that occasional case of acute appendicitis, as the life of his patient usually hinges upon his prompt action.

When a patient presents any symptoms that could in any way be attributed to abdominal disease, a satisfactory abdominal examination must be obtained. It is my practice to examine the abdomen first, as the baby is less apt to be crying at this time. This may be a difficult maneuver, but by care and ingenuity success is usually our reward. In my experience, localized tenderness has been more constantly found than localized rigidity. In fact, in the early cases, I am guided more by localized tenderness than any other one physical finding. Abdominal distention is usually not found unless there is general peritonitis. Rectal examination may be of aid, but is usually disappointing. A palpable mass is not found unless there is local abscess formation. Flexion of the right hip may aid in the diagnosis.

The temperature may be normal or only slightly elevated and is of little aid in arriving at the diagnosis. The same may be said of the leucocyte count. The average case will give a moderate elevation in the total count as well as an increase in the polymorphonuclear neutrophils. However, subsequent case histories will show the widest possible variations.

While most cases of acute appendicitis will be typical both as to history and physical findings, we must prepare ourselves to diagnose the atypical case. This will necessitate careful attention to all details of the history as well as to each point in the physical examination. Localized tenderness in the right lower quadrant is the one most important and constant finding. If in addition the patient is markedly constipated, the evidence is strongly in favor of acute appendicitis, regardless of the temperature. Even the absence of vomiting does not rule out acute appendicitis, as will be demonstrated.

Differential Diagnosis.—Acute gastrointestinal disturbances most frequently demand differentiation from acute appendicitis. While the blood picture may be of help, particularly if normal, we must rely chiefly upon palpation of the abdomen.

Acute intestinal obstruction and intussusception present a more sudden onset and the early symptoms are more severe. Marked early distention suggests obstruction. The presence of bloody mucous stools and a palpable tumor are diagnostic of intussusception.

Pyelitis, especially on the right, may present a perplexing situation early in the attack and before the pus begins draining. The tenderness is usually higher and more posteriorly. However, this should not be confused with a retrocecal appendicitis. White and red blood cells may also be found in the urine during attacks of acute appendicitis. Again we must rely upon local palpation. Even then mistakes are made.

The differential diagnosis between lobar pneumonia or pleurisy on the right side and acute appendicitis probably offers us the hardest problem of all. Such a chest lesion may give nausea, vomiting and local tenderness and rigidity over the right side of the abdomen. If the onset has been sudden, with a quick rise in temperature, accompanied by a cough, it is more likely pneumonia, even with negative chest findings. Even roentgenographic examination in early pneumonia of childhood is usually negative. While pneumonia tends to give a higher leucocyte count than acute appendicitis, it is not dependable. The pulse-respiratory ratio seems to be of little value in children. The patient rarely looks toxic with early appendicitis, but may be quite toxic with early pneumonia. Painstaking care in examining the abdomen is again our chief source of diagnostic information. In pneumonia, the muscle rigidity is likely to be more prominent than is the localized tenderness. Abdominal respiration occurs in pneumonia. Stone suggests immobilization of the right diaphragm by deep pressure under the costal margin. This

maneuver relieves the abdominal pain and tenderness due to pneumonia.

During acute acidosis with severe nausea and vomiting, there may be abdominal pain with tenderness and some rigidity due to intestinal spasm and without inflammation of the appendix. However, in some of these cases, there is real involvement of the appendix which seems to be the exciting cause of the acidosis, the latter being a symptom and not a disease. Due to the tendency of acidosis patients to be stuporous, the abdominal pain and tenderness may be diminished and made out with difficulty. In these cases, the presence of a leucocytosis and especially an increase in the neutrophils may be of value. However, the fact that the history may be more important than the blood picture is well illustrated by the following case:

Case 1.—Mary C., five years old, five days previously had developed colicky abdominal pain with vomiting and a slight elevation of temperature. She was given castor oil without results. The following day she was still vomiting, but the abdominal pain was not so pronounced. However, the pain returned the next day and was more pronounced in the right lower quadrant. At this time she also began coughing and complained of a sore throat. The family physician said she had bronchopneumonia and acute tonsillitis. She was still markedly constipated, enemata giving no results. The day before admission she became drowsy.

On admission her temperature was 103.2°, pulse 146, and respirations were 36. She was comatose and badly dehydrated. Her tonsils were moderately enlarged and red. The ears were negative. There was definite impairment of resonance in the right exilla, but no bronchial breathing. There were fine and medium moist rales at both bases posteriorly. The abdomen was moderately distended, but soft. There was neither tenderness nor rigidity. Rectal examination was negative. She was vomiting almost constantly. The vomitus was not fecal in odor. Repeated enemata gave neither stool nor gas.

White blood cells were 8,150; neutrophils 60 per cent, lymphocytes 30 per cent, large mononuclears 8 per cent, eosinophils 2 per cent. The urine showed a definite trace of albumin and an occasional white and red blood cell. There were a few hyaline casts.

On account of the vomiting and obstipation, it was decided that she had an intestinal obstruction. With the onset typical of acute appendicitis, it was thought that the obstruction was probably due to an acute appendicitis in spite of the negative abdomen and normal blood picture.

Operation revealed a perforated gangrenous appendix with general peritonitis.

Evans, Brennemann and Scobey, as well as others, have called our attention to the relationship between abdominal pain and infections of the upper respiratory tract. This pain may be referred, but is also frequently due to hyperplasia of the mesenteric or retroperitoneal lymph nodes. Brennemann goes further and states that not only do upper respiratory infections cause abdominal pain and even localized tenderness, but that these infections predispose to acute appendicitis. He further states that when the patient presents physical signs of acute appendicitis the presence of a throat infection lends weight to the diagnosis rather than against it. When this lymphadenitis occurs in the right lower quadrant, which is its most frequent location, it may be impossible to differentiate it from acute appendicitis. The only difference is that the tenderness in acute appendicitis tends to be more progressive. Unfortunately, however, if we always wait for this progress, the delay may be fatal. The following case illustrates the pitfalls of such a situation:

Case 2.—Frank B., 49 months old, was seen December 22, 1930. He had had fever for four days with a head cold and had had a cough for two days. The temperature had been as high as 103°. There had been no vomiting. The bowels were evacuating satisfactorily with milk of magnesia. On examination, the temperature was 100.5°. The right ear drum was red, but there was no bulging. The left ear drum was normal. The tonsils were enlarged and acutely inflamed. The following day the mother 'phoned that he was better. He was seen again on December 24. The night before he had complained of stomach ache. The mother gave soda water, which was promptly vomited. The temperature was 101°. The right ear was better, but the tonsils were still acutely inflamed. The abdomen showed very slight tenderness over McBurney's point. White blood cells were 17,000, neutrophils 79 per cent. During the following night he had a rigor with temperature to 103°. When seen in the morning, he was drowsy and did not want to be disturbed. He still complained of abdominal pain. His temperature was 100.0°. The tonsillar inflammation was subsiding, but there were numerous fine and medium moist rales in the right axilla and right base, posteriorly. There was still definite tenderness in the right lower quadrant with slight rigidity of the lower right rectus. White blood count was 16,750, neutrophils were 82 per cent. One of my pediatric colleagues saw him in consultation with me and while he agreed that there was slight tenderness over McBurney's point, it was decided to wait on account of the definite pathological condition in the right chest. On the following morning, the chest was still essentially the same. However, the abdominal tenderness was more marked and there was some distention. Operation revealed a ruptured appendix with an abscess fairly well walled off. The patient vomited only one time following the administration of soda water.

McGee reports an allergic patient with attacks typical of acute appendicitis. Time will not permit the discussion of other rare lesions that are sometimes confused with acute appendicitis.

The following case will again reveal the importance of constipation and the absence of vomiting:

Case 3.—Jack J., age 32 months, complained of "stomachache" during the night. He was constipated. There had been no vomiting. His temperature was 102.8°, pulse 150, and respirations were 48. The abdomen showed slight gaseous distention. No masses were palpated. Neither tenderness nor rigidity was present. White blood cells were 6,500, neutrophils 88 per cent. The possibility of an acute appendicitis was discussed, but the evidence was not felt sufficient to warrant a surgical procedure. At 9:00 p. m., the mother reported that the patient had rested well during the afternoon, had taken liquids well and that there had been no vomiting. He was hungry. The temperature had been normal in the afternoon, but had risen again to 101.2°. Enemata still gave no results. No purgative was given. He was seen again early the following morning. The night had been fairly comfortable. At this examination there was slight but definite rigidity over McBurney's point with tenderness on moderate pressure. White blood cells were 11,250, neutrophils 74 per cent. Operation revealed a gangrenous retrocecal appendix. He did not vomit during the entire course of the disease.

The following case illustrates the importance of seeing every patient with abdominal pain rather than prescribing over the telephone. A child with abdominal pain should never have a purgative until he has been examined and the possibility of an acute appendicitis eliminated. The high leucocyte count is also interesting.

Case 4.—Sara M. was 47 months old. The mother 'phoned at noon to ask how much purgative should be given. She reported that the patient had awakened at midnight with abdominal pain and vomiting. Since that time she had vomited everything taken by mouth. Enemata had given two constipated stools. When the possibility of acute appendicitis was suggested, she scoffed the idea. However, the patient was seen shortly afterward. Her temperature was 100.8°. There was definite tenderness over McBurney's point, but no rigidity. White blood cells were 36,500, neutrophils 93 per cent. When seen later at the hospital she did have definite rigidity over the appendix. Operation revealed an acute appendicitis that was not gangrenous and there was no peritonitis.

When the diagnosis of acute appendicitis is made, the treatment is surgical and no time should be lost in removing the offending organ. In my experience, children tend to rapid general peritonitis rather than abscess formation. This is probably due to the free use of purgatives. Some writers attribute the rapid spreading to the lack of a long omentum which might aid in walling off the infection. However, the infection can be adequately walled off between loops of the intestine and without help from the omentum. It is interesting to note that in *Case 2* there had been no purgative given after the onset of abdominal symptoms and the omentum was not involved in the abscess formation. When in doubt about acute appendicitis, surgery is the procedure. It is much wiser to open the abdomen in a case of lobar pneumonia than to allow an appendix to rupture. The mortality will be much lower.

SUMMARY

In this paper nothing new has been offered. I have only attempted to show the importance of keeping acute appendicitis always in mind, even with the youngest infant. In arriving at the final diagnosis, both the history and physical findings are important. Tenderness, localized over McBurney's point, is the one most important physical finding. Next in importance is localized rigidity. Marked constipation is additional evidence. Lack of vomiting is of no importance. In *Case 3* the respiratory rate was increased more in proportion than the pulse rate. This has been noted in other cases not reported. When the final diagnosis is made, if acute appendicitis cannot be reasonably eliminated, the patient should receive the benefit of the doubt and should be operated upon. No purgative should be given until acute appendicitis is positively ruled out. In conclusion, I feel that I can honestly state that anyone who practises medicine wisely and safely will have normal appendices removed, but the live child is attained as his goal. Any other course will be tragedy.

REFERENCES

Brennemann, J.: The Abdominal Pain of Throat Infections. Amer. Jour. Dis. Child., 22:493-499, 1921.
Brennemann, J.: The Abdominal Pain of Throat Infections in Children and Appendicitis. J.A.M.A., 89:2102-2186, 1927.
Freedman: Forty-Two Cases Appendicitis Occurring During Upper Respiratory Infection. Arch. Ped., 46:604, Oct., 1929.
Scobey, R. R.: Abdominal Pain in Children with Upper Respiratory Infections. Arch. Ped., 48:602-606, 1931.
Pounders, C. M.: Appendicitis in Children. Sou. Med. Jour., 24: 686-690, 1931.

DISCUSSION (*Abstract*)

Dr. John Signorelli, New Orleans, La.—Not only in the essayist's experience, but in the experience of all men who practise pediatrics, and I might say in the experience of all men who practise general medicine, it has been found that appendicitis in children is on the increase. Whether that increase is due to improved methods of diagnosis, or whether it is a true increase, because of the fact that we look for appendicitis more than appendicitis was sought for before, we cannot say. Nevertheless, it is a fact that appendicitis does exist in pediatrics. Appendicitis has been reported in children as young as forty-one days of age, with true symptom-complex, operation and recovery.

Because the diagnosis of typhlitis and perityphlitis is on the decrease, we might say that the increase in the diagnosis of appendicitis parallels this decrease, due to two factors: first, we look for appendicitis more carefully than it was sought for before; and, second, we find it because the methods that have been handed down to us are efficient. The essayist has shown you how the diagnosis can be arrived at without any doubt. He referred to localized pain. It has been my experi-

ence that the pain of appendicitis in children need not be localized over McBurney's point. There have been many cases in which the pain is referred and might distract one's attention from appendicitis. I make it a rule to consider that any child with colic is a potential appendicitis case until I can prove the non-existence of appendicitis. If a child, say from the second to the fifth year of life, complains of abdominal pain and we ask where the pain is, that little one will place his hand on the abdomen. I have tried to get these children to take one finger and point where the "stomach aches," and almost invariably find they put the finger on the navel.

The interpretation of the blood count, as pointed out by the essayist, is probably the most important single factor in arriving at a diagnosis. The increase in polymorphonuclears, I think, is more important than the increase in the total leucocytes. The fact that the patient is not so toxic as in pneumonia is important. Then the fact that they take a certain posture is important. Patients with appendicitis do not sit up or struggle; they want to lie down, want to be still. Usually the right thigh is somewhat flexed, and any attempt to straighten out that limb results in pain,

There should be no loss of time in handling the case. Without hesitation I agree with the essayist that medicinal treatment, or medical treatment, is absolutely out of the picture. Operation is the only procedure to be considered. It is better, I agree again with the essayist, to take out ten normal appendices than to lose one life.

Let us keep away from purgatives. We should also get away from the routine use of enemata in any colic. It is better, if you are going to use an enema at all, to use a soothing enema. Glycerine enemas will certainly give results, but they are very irritating, and I think their use absolutely should be excluded in any painful abdominal condition.

Dr. W. Ambrose McGee, Richmond, Va.—I want to reiterate what I said yesterday, that the ordinary blood count as we use it now is of little value in many diseases.

I agree with the essayist that a normal appendix had better be out than to leave in a ruptured appendix.

The pain is generalized and not localized over McBurney's point.

Dr. E. H. Terrell, a proctologist of Richmond, says no irritating enema should be given at any time. He was speaking with reference to soapsuds enemas, which are frequently used.

Do not use any laxatives, not even as mild a laxative as milk of magnesia.

In studying the blood picture you will notice a change to the young forms of white blood cells in a few hours, which will put you on your guard hours ahead of the ordinary white and differential counts. If you put your finger over McBurney's point and exert pressure, you will usually get retraction of the right testicle in the presence of gangrene.

Dr. Kennedy (closing).—Again, I want to impress upon you the importance of keeping acute appendicitis in mind, regardless of the age. The child usually refers all abdominal pain to the navel. The location of tenderness by palpation is, therefore, more reliable than the statement as to pain.

THE MAINTENANCE OF A HEALTHY CERVIX*

By WARREN E. MASSEY, B.S., M.D., F.A.C.S., Dallas, Tex.

The cervix of the uterus is one of the chief points of access to the human body for infection. It is beseiged by diseases and frequently subjected to injury, and thereby becomes a focus of infection. Hence, one of our important health problems is the maintenance of a normal or healthy cervix.

The health of the cervix may be secured, first, by repairing injuries and eradicating diseases, and second, by teaching preventive medicine to the patient.

The cervix is injured only by certain operative procedures and during dilatation. These processes are usually under the supervision of a gynecologist or an obstetrician.

The gynecologist, regardless of the purpose for which he may have dilated the cervical canal, often produces a laceration of the cervix. A curette may be used advantageously only in obtaining tissue for pathological examination, and in ridding the uterus of the remains of a decidual abortion. Extensive scraping of the cervical canal opens avenues by which bacterial organisms may invade the tissue and produce severe infection. A too zealous use of the cautery in the cervix will give an extensive burn, which may be considered as a laceration since the tissues have been widely destroyed. The injury heals with extensive scar formation which may obliterate the cervical canal. Moreover, the scar will markedly interfere with dilatation during a subsequent labor and perhaps cause a laceration of the cervix at the same time.

The patient is often not encouraged to conserve her strength during the first stage of labor, but rather is permitted and even urged to force dilatation by bearing down during pains, without warning of the damage that she may do to herself. The first stage of labor should be conducted in a manner that will give relief from pain, that will save the patient's strength, and that will prevent injuries to the cervix. The untimely use of pituitrin and other oxytoxics is a frequent cause of

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tears of the cervix, since they are given with the idea of hurrying the end of the first stage. Any procedure by which one attempts to deliver a fetus through a cervix not completely effaced and completely dilated almost always will result in a torn cervix.

Every cervix should be inspected immediately after the third stage of labor and all lacerations repaired at once. A second inspection should be made at the end of six or eight weeks and the failure of healing of lacerations should be noted.

Many cervices will be found not completely healed, even though no lacerations were ever present, but will present symptoms of a cervicitis. When this condition exists, all measures, which will stimulate healing, correct malpositions, prevent pelvic congestion and promote cleanliness are again to be insisted upon. A patient who understands her condition will usually carry out instructions which aim toward relief. The kind and amount of exercise required is an important factor. The use of douches for cleansing, medication and applying heat as a therapeutic agent are very important. Light cauterizations of unhealed areas at short intervals will destroy the infection and stimulate healing.

Even though pregnancy may not have preceded, the cervix may be severely diseased either acutely or chronically. Too often only casual inspection is given. First, the secretion of the cervix and cervical canal must be examined for bacteria. Second, a portion of any part of the tissue that may seem structurally abnormal should be removed and examined for malignancy in order that cancer may not early escape our attention.

Acute cervicitis is best treated with rest in bed, frequent warm douches, and local medicinal applications. Otherwise, the removal of infected tissue with light cauterizations will usually suffice. Care must be taken not to produce a great deal of scar formation about the cervical canal and thereby cause a stenosis of the cervix. Every process which will destroy the infected tissue and heal the cervix with good drainage of the cervical canal is commendable.

Those cervices that do not respond to nonoperative measures must necessarily be treated radically. The choice of operative procedure will depend upon the individual case and the judgment of the physician.

We are being forced to consider the health of the cervix in relation to the health and vitality of the whole body. Not long ago we thought of the basal metabolic rate as an index to the function of the thyroid gland. Later we began to think of it as an index to the function of the whole system of internal secretory glands. We will shortly consider it as an index to health. Surely the body metabolism supplies us with vitality and resistance to disease. Gland products will stimulate the body to new action and produce greater resistance, and, therefore, will aid in the treatment of cervical disease as well as in disease of other organs.

The basic and common sense laws in diet, rest and exercise should not be neglected. Cervical disease may not be treated successfully in a body already overwhelmed by other diseases.

The cervix by its structural formation is composed of tissues that are continually in a state of imbalance and we may think of the different epithelia of the cervix and cervical canal as being restless. Any irritation or injuries of these restless tissues stimulate abnormal growth. The tissues thereby assume a form closely related to and even developing into cancer. Several accepted authorities have concluded that 90 per cent of all uterine cancers occur in the cervix and that one-third of all atypical tumors in the female are cervical cancers. Hence the health of the cervix becomes a vital problem in the prevention of cancer.

In relation to cervical illness the medical profession has neglected an important part of preventive medicine. If the patient were taught something of the anatomy and physiology of the reproductive system, she would realize the importance of frequent pelvic examinations and would cooperate with and demand more of her doctor. The high mortality of cancer would in time be diminished and other cervical diseases eradicated.

Women have assumed a large place in the nation's industrial life. As soon as industry realizes that the efficiency of these workers is impaired by cervical diseases, the same attention will be given pelvic disorders that is now accorded to other diseases, and the subject of hygiene of the reproductive system will be stripped of all hesitant discussion in order that remedies may be found.

The government is endeavoring in many ways to acquaint the people of the Army and Navy with these problems and to secure their cooperation in health examinations.

The whole problem of health of the cervix depends upon cooperation between patient and

physician. It is the duty of the physician to direct the way.

DISCUSSION (*Abstract*)

Dr. Thomas B. Sellers, New Orleans, La.—Infection of the cervix may cause not only local symptoms such as discharge which is obstructive, but pelvic pain, which is oftentimes mistaken for pelvic disease in the abdomen, and which is capable of producing conditions corresponding to any other focus of infection in the body, such as comes from tonsils, teeth or sinuses.

Laceration of the cervix offers a favorable field for cancer. It is not the laceration itself, but the irritation from the infection. In checking up our patients following delivery we find that a large percentage have mild erosion of the cervix six weeks after delivery. They have had a perfectly normal delivery with slight unilateral or bilateral lacerations of the cervix. Light cauterization, with the cautery or with some chemical, will prevent future trouble. In the more severe lacerations we must not forget early repair.

I want to mention a recent article by Dr. Roblee, of St. Louis, in the *American Journal of Obstetrics and Gynecology*, on the treatment of lacerated and infected cervices. He advises using diathermy in treating endocervicitis, but recognizes that the cautery has a field, especially in handling lacerated cervices.

In all suspicious cases, sections should be examined. Where we suspect cancer, we take sections and show the pathologist what area we want examined especially. Sometimes we get a negative report in early cancer because the technician has cut the section improperly.

In cauterizing, do not cauterize the whole area; leave a strip uncauterized in case you have to come back the second time.

Dr. M. J. Gelpi, New Orleans, La.—Injuries directly produced by the gynecologist or obstetrician at times are unavoidable. The application of forceps, particularly in the case of the primipara, by me, almost always causes a certain amount of damage which I cannot avoid. I have never been able to persuade myself that the proper procedure was the routine immediate repair of cervical lacerations, even in hospital practice, to which my obstetrical work is limited. We are always faced with a certain amount of edema. In addition, a condition is produced in which it is difficult to get accurate determination of the edges; and most important of all is the fact that we are always dealing with wide open lymphatics and blood vessels which are a potent source of trouble in disseminating infection. However, in the presence of hemorrhage, naturally, we must give the cervix immediate attention.

If post partum erosions are looked for at the sixth or eighth week of post partum examination it is surprising how often we find them and the logical procedure would seem to be to handle them at that time.

Cancer is so important that the proper attitude is to consider all suspicious lesions carcinoma until you have proven that they are not. If that attitude were more generally adopted, undoubtedly we should come across a number of early cervical carcinomas.

In lacerations and infections, either superficial or deep, the first point to determine is whether or not the main trouble comes from the laceration or from the infection. If the laceration seems to be the predominant feature, the problem then again arises as to whether simply repairing should be done, or amputation, above infection. The logical thing would seem to be to repair, keeping in mind the fact that amputation means a certain percentage of abortions in the case of subsequent pregnancies. In superficial infection the logical procedure seems to be to treat it as Dr. Sellers has indicated, with cautery or silver nitrate. But in the deep-seated infections the only logical thing to do is to remove the deeply-seated cervical glands by means of amputation.

Certainly no one would deny the importance of educating women as to the danger of cervical disease.

Dr. Emil Novak, Baltimore, Md.—Shortly after the period inaugurated by Dr. Batty of Georgia, a good many years ago, in connection with the removal of the ovaries for all sorts of disease, epilepsy, nervous headache, and so on, there was an era when surgical operations of all kinds were done for any disturbance. Even the removal of a cervical plug was considered to be important in the prevention of conditions such as nervous headache. This era was followed by one in which the cervix was more or less disregarded, and it is interesting to note now that we have a revival of surgical treatment of the cervix for an entirely different and much more specific reason, the treatment or the prophylaxis of cancer.

I should like to say a word about the use of the cautery, which I think has tremendous value in eradicating the so-called precancerous lesions of the cervix. I have always thought the cautery was not altogether an unmixed blessing. Cauterization of the cervix is very often improperly done and leaves in its wake uncomfortable conditions which are never eradicated. The cautery should not be too large. Some of the commercial types are wide, and in going through the cervix destroy practically all the endothelium. A cautery should be narrow, so that it does not kill everything in its path. The degree of cauterization should vary with local conditions. A multiparous cervical canal will stand more cauterization than a narrow primiparous canal. If there is a great deal of erosion we can go well behind the cervical canal because we want to destroy a lot of tissue. We would not dare to do it with a nulliparous cervix.

One undesirable condition we have seen after the use of the cautery has been the contraction of the external os of the canal. Sometimes the canal is very narrow and you cannot get a probe in, and sometimes just within it there is a little granulation tissue and drainage from the canal has been blocked. Dr. Curtis, of Philadelphia, called attention to this blocking of the cervical canal. If you put a little probe into such a canal, frequently out will come a bleb of muco-pus.

Many men in general practice depend on palpation for cervical findings. No examination of the cervix is complete without a good speculum examination in the best light you can get, because frequently you get one sort of impression by feeling the cervix, and when you put it under a good light your whole idea is changed. It may look red and ugly under speculum examination. I do not think the majority of cervices have to be subjected to biopsy. A man of moderate experience can be reasonably sure whether a cervix is benign or malignant. If the lacerations of the cervical mucosa are firm

and thick, you may be sure you will not find evidences of malignancy. If, on the other hand, you find the mucosa red and angry with some tenderness, you may be sure in many cases that it is suspicious, and you should do a biopsy in cases of that sort. But they will not be more than 5 per cent of all the cervices you encounter.

A word about a cancer educational campaign. With all that has been said I agree, but I think after all that the most beneficial cancer education propaganda we can carry on is with the individual. Whenever I get a woman with an abnormal cervix, bleeding or almost any gynecological condition, I go out of my way to give her a little talk, describing to her the outlook for her future. When we reach the stage where every gynecologcial consultation is a prophylactic consultation, we shall have taken a great step forward in the cancer campaign.

THE BORDERLINE PELVIS*

By EDWARD P. ALLEN, M.D.,
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The borderline pelvis is the one that gives us trouble. We need not worry about the definitely contracted or marked abnormalities because the indications in those conditions are positive. I shall review very briefly three conditions: first, the outlet contractions; second, the justo-minor pelvis; third, the simple flat pelvis. The measurements in this type of pelves are as follows:

	Spine	Crest	Troch.	Ext. Conj.	True Conj.	Tubers	Posterior Sagittal
Male type or cont. outlet	25	28	30	19	10	8	7-8
General cont.	21	25	29	18	8½	7-9	
Simple flat	24	27	30	19	9	9	

Ninety-eight per cent of all women with a normal pelvis can be delivered spontaneously; 70 per cent of women in the other types mentioned can be delivered normally if let alone; 30 per cent of women with contracted or borderline pelves will probably need assistance; and it is this 30 per cent that I wish to consider today. The pelvic inclination, especially in the patient with a flattened pelvis, is just as important as the actual size.

Patients with contracted outlet or male type pelvis often have to be delivered at the expense of the posterior sagittal and the perineum. The posterior sagittal diameter, as you know, is estimated by measuring from the center of a line drawn between the tuber ischii to the tip of the sacrum. In order that spontaneous labor may occur in these funnel pelves, the posterior sagittal must be increased in length in proportion as the transverse is lessened and the pubic arch narrowed. For example, the bi-tuberosities plus the posterior sagittal must measure at least 15 cm. to allow the passage of a normal size head. While none of us knows the malleability, or how much a normal head can mold without danger, we do know that there is a limit.

This type of pelvis is often found in the masculine type woman with broad shoulders, large thick bones, high palatal arch, and crooked upper teeth. The diagnosis is easily made by the ordinary methods of pelvimetry. Labor proceeds normally until the outlet is reached and as a rule deep medio-lateral episiotomies and the aid of low forceps will be all that is necessary. In making these measurements one must not forget the acute anterior curve of the sacrum which is very easily diagnosed by palpation, yet too often overlooked.

The justo-minor pelvis is a generally contracted or a generally small pelvis. The measurements are in perfect proportion and usually found in small girls with thin bones, thin symphysis pubis with a normal inclination and no sway in the back. They may be delivered normally if the babies do not become too large. Prenatal care, proper diet, proper exercise, thyroid extract given at the right time and in proper dosage will help to control the size of the babies, and in this way, to a certain extent, prevent disproportion. The etiological factors are: (1) heredity; (2) prematurity at birth; (3) bottle feeding; (4) marasmus; (5) improper hygiene at puberty; (6) improper dress; (7) endocrines.

The simple flat pelvis and the pelvis bordering on the rachitic type are the ones that give us most trouble. They are usually found in the large, fat, chubby, close-built woman with short bones, sway back, and, therefore, a prominent promontory. The symphysis pubis is high, thick and often the inclination is not normal. The sacrum is more curved from above downward than normal, the promontory is low and set forward, therefore shortening the conjugate vera. The babies are large and often postmature. The heads ride high above the inlet, they are over-ossified, do not mold easily, and labor is prolonged and difficult. These patients have some endocrine disturbance, especially

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hypothyroid or hypopituitary conditions. They are big eaters, more or less indolent, do not take the proper amount of exercise; they gain more than the average 15 to 20 pounds during the last six months of pregnancy and their babies likewise gain too much. In this type of patient the basal metabolic rate is low, averaging about minus 20. Out of 500 consecutive cases taken as they come to the office, we found that in the first trimester the average basal metabolic rate was minus 15 to 20; the second trimester it was zero; the third trimester the rate was plus 10 to 15. Thus I am convinced that Dr. Polak's statement that all pregnant women have a deficiency of their thyroid secretion at least during a part of their gestational period, and, therefore, should be given small doses of thyroid extract, is correct. My opinion, however, is that thyroid extract should be given cautiously and the patient kept under close observation by a competent internist, so that we may be sure that we are not overdoing the thyroid therapy.

The two etiological factors in this type of pelvis are frequently endocrine disturbance and rickets. A complete, well-taken history will show that some of these girls were reared under bad hygienic conditions with improper food and lack of sunshine which explains their tendency to rickets.

The diagnosis is not hard. It is made by inspection and by the careful use of the pelvimeter, which is important. If we palpate every symphysis that comes to our office it will soon be easy to recognize the abnormal as well as the normal.

The x-ray is also invaluable not only in measuring the size of the pelvis, but in measuring the size of the baby's head and in a way determining the amount of disproportion. A lateral view showing the sacral promontory will give information as to the degree of sacral curve and the amount of sway back, and, therefore, the prominence of the promontory. Any internal pelvic measurement can be made accurately by this method. The internal conjugate and the size of the baby's head can be determined as follows: shave the pubic region and fasten with adhesive tape a lead marker over the pubic bone and one at the lumbo-sacral junction. Place the patient in a straight lateral position on an x-ray table which is equipped with a Bucky diaphragm. Then with a pelvimeter measure the actual distance on the patient between the lead markers and center the target exactly over the sacral promontory which is a point midway between these markers. After the film is finished measure with a centimeter tape on the film the distance between the shadow of the anterior marker and the shadow of the promontory. Also measure the same distance as was before measured with the pelvimeter, namely: the distance between the markers. This distance on the plate is found greater than before. Since this distance is greater due to divergence of rays, the distance from the shadow of the anterior marker to the shadow of the promontory will be greater and in the same ratio. Thus our proportional statement will be:

X-ray distance (lead to lead): x-ray distance (anterior lead to promontory) :: actual lead to lead: X.

X is the conjugate vera plus the distance from the anterior marker to the inside of the symphysis. This distance can be obtained by the use of small calipers, one tip being placed on the inner side of the symphysis and the other on the anterior lead marker. Therefore, this distance subtracted from X equals the conjugate vera. For instance, the distance from the anterior lead marker to the inside of the symphysis is 5.5 cm., which is to be subtracted from X. Measurement from the anterior lead marker to the posterior lead marker on the patient is 24 cm. This is the actual known distance and we place it for the third term of the proportion. Measurement on the x-ray plate from the anterior lead marker to the posterior lead marker is 33 cm. On the x-ray plate from the anterior lead marker to the promontory is 22 cm. Measurement of the baby's head on the plate bi-parietal is 13.5 cm. Occipito-frontal is 16 cm., thus our proportion: 33:22::24:X.

X equals 16, distance from anterior lead to promontory. Sixteen minus 5.5 equals 10.5, conjugate vera. The baby's head can be computed in like manner, using the known distance for third term:

33:13.5::24:X.
X equals 9 9/11 bi-parietal.
33:16::24:X.
X equals 11 7/11 occipito-frontal.

The head normally enters the pelvis transversely in synclitism or parallelism. The sagittal suture lies parallel to the long axis of the inlet and midway between the promontory and symphysis, but in the small or the flat pelvis it may enter in asynclitism either anterior or posterior, and then we have to deal with a parietal boss presentation, deflexion or military attitude, thus increasing the abnormality. Anterior asynclitism is usually found in multiparous women with a pendulous abdomen and in women with a sway back and flat pelvis. Posterior asynclitism is found in the small, thin, patient, usually a primipara, with a straight back, rigid abdominal muscles and a justo-minor pelvis, the child's body being held close to the mother's spine.

The fetal morbidity and mortality here is high due to excessive forces exerted on the head

during the process of labor. (1) The unusual forces on external covering cause abrasion, contusion and cephal hematoma. (2) Overriding of bones and excessive molding cause cranial fractures. (3) Pressure applied to brain substance often causes laceration, contusion or concussion. The antero-posterior diameter of the head is shortened by pressure, causing laceration in the tentorium just below its junction with the falx.

The management of these abnormalities tests one's patience and ability. These women have long, painful labors; slow dilatation; the head rides high, and one is compelled to do something for them. We give them morphine with magnesium sulphate, insist on their resting, do not allow them to bear down until dilatation is complete, and when the morphine loses its effect it is either repeated or quin-ether-oil is given per rectum. The head will come down to mid pelvis and there stick in a deep transverse arrest or it may come to the perineal floor. From the long labor the mother is exhausted or the baby shows signs of exhaustion and must be delivered by forceps if we expect to get a live, uninjured baby.

It is the opinion of most men that forceps properly used will cause fewer birth injuries than the prolonged pushing and pounding in cases of disproportion. Version is a difficult operation in contracted pelvis and if the head remains high one should not wait too long to advise section. Make your diagnosis of disproportion before your patient goes into labor and do a section early because a woman who has been in labor three hours or more with ruptured membranes is potentially infected already, which increases the morbidity and mortality.

In conclusion let me emphasize: (1) if there is marked disproportion do a section early without manipulation from below. One of the signs of disproportion is a head riding high above the inlet after a trial labor. (2) If version is to be done try to conserve the bag of waters, if possible; use abundance of tincture of green soap as a lubricant; use chloroform anesthesia; do not attempt to deliver until the cervix is completely dilated, and above all do not hurry. You have five, ten, fifteen or more minutes to do this operation if so much is required. Do not make too much traction on the after-coming head. Either maneuver the baby through by pressure from above and skillful guidance from below or use forceps (Piper's). (3) If forceps are to be used one should have head presenting, bladder and bowels empty, a live baby, completely dilated cervix, ruptured membranes, head in the mid pelvis or lower, and an accurate diagnosis of position. (4) Beware of a woman with a sway back and a high or thick symphysis pubis. (5) Make all measurements carefully, including measurements of the ulnar bone, rhomboid of Machaelis, and an inspection of the palatal arch.

Dr. Polak told us that the size of the pelvic inlet was in direct proportion to the length of the ulnar bone and that a wide rhomboid indicated a flat pelvis.

SPLENECTOMY FOR UTERINE BLEEDING*

By SHIELDS ABERNATHY, M.D.,
Memphis, Tenn.

In the study of uterine bleeding where there are no demonstrable pathological changes in the pelvic organs remote causes must be sought and it is the purpose of this paper to present for your consideration the subject of hemorrhagic purpura as viewed from a gynecologic standpoint. The diagnosis of this condition is often overlooked or delayed and numerous ineffectual measures are instituted for its relief by even the most competent men.

It is not within the scope of this paper to enter into a full discussion of hemorrhagic purpura or to present the various views in regard to splenectomy as a curative measure, but to direct my remarks to the gynecological phase of the disease as manifested by uterine bleeding.

From my series of cases of hemorrhagic purpura where splenectomy was done I have selected two in which uterine bleeding was the chief and, in the early stages, the only symptom, and for this reason they are placed in a gynecological classification. These two cases form the basis of this discussion. It is to be noted that there are a number of sharp contrasts between the two cases, particularly with reference to time of diagnosis and the plans of management. The first case resulted in failure of relief of symptoms and the second was successful. In the first case, the diagnosis was delayed on account of incomplete study of the patient's blood. Multiple transfusions of whole blood were ineffectual. Irradiations of the spleen with both x-ray and radium were without benefit. Two intrauterine irradiations with radium produced

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no favorable results. Splenectomy was delayed too long. Death was not considered to be a surgical death and there is reason to believe that it would not have occurred if splenectomy had been done earlier in the course of the disease before secondary changes had occurred.

The second case presents fewer features of academic interest. Whether or not the diagnosis was made by the physician who treated her with radium is not known. The diagnosis was made fairly early in the disease. Irradiation of the uterine cavity produced no lasting benefit. Transfusions of large volumes of whole blood brought about temporary improvement only. Both cases were definitely proven types of thrombocytopenic hemorrhagic purpura.

Case 1.—Miss L. M., age 19, was admitted to St. Joseph Hospital October 29, 1922, her chief complaint being of uterine bleeding and weakness. The history when first taken stated that the patient had always enjoyed good health and had had no serious illnesses up to two weeks prior to admission when her period appeared at the expected time but the flow was very profuse, painless, and there was frequent passage of large clots. The flow had continued to the date of admission. The patient complained of weakness and shortness of breath. Physical examination showed a pale, anemic but well nourished girl. General physical examination revealed no abnormalities except a short systolic murmur at the base of the heart, and the apex slightly to the left. Bimanual pelvic examination did not reveal any abnormalities except a free bloody flow from the cervical canal.

On admission the pulse rate was 120, temperature 100°, respiration 18, white blood count 7200, polymorphonuclears 78 per cent, small lymphocytes 15 per cent, large lymphocytes 7 per cent, hemoglobin 58 per cent. A catheterized specimen of urine was negative. The first impression of the case was that it was an extreme chlorosis and iron tonics were begun and the patient kept under observation. The uterine flow became less profuse but the rapid pulse rate and low grade fever persisted. On November 4, 1922, examination of the blood showed red blood cells 2,620,000, and hemoglobin 31 per cent. The possibility of an incomplete abortion suggested a diagnostic curettement which was carried out November 6, 1922. Nothing was found in the uterine cavity. On November 7, 1922, a transfusion of 400 c. c. of blood was given by the citrate method. This was followed by considerable improvement in the condition of the patient, who continued to have a pale red uterine flow. On November 15, 1922, the cervical canal was dilated and 100 mg. of screened radium were placed in the uterine cavity for five hours. There was no benefit from this and on November 26, 1922, the erythrocytes were 2,240,000 and the hemoglobin 30 per cent. At this time a small purpuric spot made its appearance on the patient's arm and this was followed by other similar spots and bleeding of the gums. Closer inquiry into the past history brought out the statement from the mother that at the age of 12 the patient had had purpuric spots, and that she had frequent nose bleeds. The diagnosis of hemorrhagic purpura was now made. In 1922, the counting of blood platelets was not a routine procedure in our hospitals and the platelet count was not done. A series of transfusions of whole blood in 100 and 200 c. c. quantities was given the patient by the 50 c. c. syringe method which was followed by cessation of the uterine flow and general improvement in the patient and she was discharged from the hospital on December 22, 1922. On January 2, 1923, the patient returned for observation and blood examination showed red blood cells 2,930,000, and hemoglobin 36 per cent (Sahli), leucocytes 6,200, polymorphonuclears 73 per cent, small lymphocytes 17 per cent, large lymphocytes 9 per cent and eosinophils 1 per cent. One hundred fifty c. c. of whole blood was given intravenously by the syringe method. Evidently a stage of remission occurred at this period as the uterine flow stopped and the patient made great improvement in every way and remained in a satisfactory condition for several months.

August 21, 1923, she was admitted to the Baptist Memorial Hospital on account of uterine bleeding and was found to be in a very weakened state. Blood examination was as follows: hemoglobin 24 per cent; red blood count 2,400,000; bleeding time 10.5 minutes; coagulation time 1.5 minutes; leucocytes 2,450, morphonuclears 72 per cent, small lymphocytes 27 per cent, large lymphocytes 1 per cent. The red blood count showed a number of the changes of severe secondary anemia. While the platelets were not counted the report states that they were apparently absent. Two hundred fifty c. c. of whole blood were given intravenously by the syringe method. Between the above date and December 3, 1923, several varying quantities of whole blood were given both intravenously and intramuscularly with some temporary benefit. On November 21, 1923, the platelet count was estimated to be about 15,000 and on November 23, 1923, the platelets were too few to enumerate. On December 3, 1923, 800 mg. hours of screened radium were administered in the uterine cavity. This was without benefit. The patient was allowed to leave the hospital on December 12, 1923, and during the following two months showed some slight improvement. On February 15, 1924, she was readmitted to the hospital and at this time the blood picture was as follows: erythrocytes 3,120,000, hemoglobin 55 per cent, platelets 21,840. The arm veins were so thrombosed that intravenous administration of blood could not be carried out and 200 c. c. of whole blood were given in the gluteal muscles. The uterine bleeding while not profuse had been more or less continuous.

During the next five weeks the greatest improvement in the blood picture while the patient was under observation occurred. On March 28, 1924, the erythrocytes were 4,320,000, and platelet count 30,240. However, there was no clot retraction after 48 hours. After consultation it was decided to irradiate the spleen with radium and 1200 mg. hours were delivered to the spleen through wooden blocks ½ in. distance from the skin. Splenectomy was advised but the parents of the patient wanted it deferred and the patient was discharged from the hospital. She continued to have a pale uterine flow and bled from the gums and nose. On April 17, 1924, her parents brought her back to the hospital and gave their consent to splenectomy. The patient was put to bed and measures were instituted to build her up as much as possible preparatory to operation. The erythrocytes were brought up to 4,300,000 and the hemoglobin to 75 per cent. Platelet count was not done but an estimate showed it to be greatly reduced.

At this time the patient complained of red spots be-

fore her eyes. Examination of the eyes was as follows: The pupils were equal and reacted to light. No strabismus was found. The eyegrounds on the right showed several hemorrhagic areas on the temple side and one or two very small ones on the nasal side. The left eye showed two hemorrhagic spots on the temple side. Both nerve heads appeared normal. For several days prior to operation the patient was given 5 c. c. of 10 per cent calcium chloride intravenously. On May 3, 1924, under nitrous oxide, ether and novocaine infiltration anesthesia, splenectomy was carried out. There was nothing unusual about the operation and there was no more bleeding than in an ordinary laparotomy. The spleen was about twice its normal size, had very much the appearance of liver tissue and while some perisplenic adhesions were present, it was easily mobilized and the record shows that the operation was completed in 30 minutes. Her pulse was 120, and respirations were 20. During the afternoon patient reacted. Her pulse was 80, of good volume, respirations were 20 and she had a satisfactory night. The following day the patient vomited more than usual and there was considerable abdominal distension. Death occurred on the fifth day. It was thought to be a cardiac death. Blood pressure on the day of death was 150/105. There was no autopsy.

Case 2.—Mrs. N. C. M., age 37 years, a housewife, consulted me on May 17, 1930, on account of uterine bleeding, weakness and anemia, and gave the following history: In September, 1929, she began to have profuse and continued uterine bleeding with passage of clots. She consulted her home physician and was given a 24-hour application of radium in the uterine cavity. Following this she did not bleed for two months, when the flow returned and she began to bleed from the gums and nose and noticed "bruised spots" on her body and extremities. She continued to flow and complained of weakness, dizziness and anemia.

Inquiry into her past history revealed that there was nothing unusual about her menstrual function prior to marriage. She had given birth to 3 children in normal labor, but flowed too freely following each childbirth. She had amenorrhea for 13 months following the second labor. For the previous several years the menstrual periods had been regular, painless but too free. In 1915, she had a nasal operation, and tonsillectomy in 1928. There was no excessive bleeding in connection with either of these operations.

Physical examination showed a well nourished but exceedingly pale woman. There were a number of subcutaneous hemorrhagic spots over the body and extremities. The gums were pale and showed hemorrhagic spots. General physical and pelvic examinations were essentially negative. Laboratory findings were as follows: erythrocytes 2,570,000, hemoglobin (Sahli) 37 per cent, coagulation time 6 minutes, bleeding time 20 minutes. There was marked achromia and anisocytosis with moderate poikilocytosis. Leucocytes were 5,700, polymorphonuclears 58 per cent, small lymphocytes 35 per cent, large mononuclears 6 per cent, and there were 1 eosinophil, and 1 normoblast. There was no contractility of the clot. The platelet count was 170,000 per cu. mm. Urinalysis was normal. A diagnosis of thrombocytopenic purpura hemorrhagica with secondary anemia was made. A blood transfusion of 600 c. c. of whole blood was given by the Scannel method. Hospitalization and splenectomy as soon as the patient became surgically fit were advised. For economic reasons the patient could not remain in the hospital and was allowed to return home, to report as soon as the benefits of the transfusion were manifest. The uterine flow ceased and there was marked gain in strength and color during the ensuing 3 months. The patient felt so well that she did not report to me as instructed. In September, 1930, the uterine flow returned in small quantities and at irregular times and there was some bleeding from the gums but the patient did not report for examination until February 3, 1931. Her general appearance indicated a marked anemia and the blood examination was as follows: erythrocytes 2,070,000, hemoglobin 30 per cent (Sahli), bleeding time 4 minutes, and coagulation time 5½ minutes. The platelet count was 163,000 per cu. mm., leucocytes were 9,200, polymorphonuclears 77 per cent. A transfusion of 550 c. c. of whole blood was given by the Scannel syringe method. Again for economic reasons the patient was permitted to return home to report in two weeks. She did not report, however, until March 9, 1931, at which time the blood picture was as follows: erythrocytes 3,679,000, hemoglobin 60 per cent (Sahli), platelet count 200,000. Urinalysis was normal. There was no uterine flow at this time. The next day, March 10, 1931, a blood transfusion of 550 c. c. of whole blood was given by the Scannel syringe method and the patient was prepared for operation on the following day. Under nitrousoxide, ether anesthesia, the abdomen was opened through a high left rectus incision which was converted into a reverse L shape by a transverse extension through the abdominal wall. The spleen was high and firmly held down by perisplenic adhesions. The lienorenal ligament was doubly clamped and divided and the perisplenic adhesions cut between the clamps. This greatly facilitated mobilization of the spleen which was now easily delivered. The pedicle was isolated, doubly ligated with No. 2 chronic catgut and the spleen removed. The muscles and fascia in the transverse part of the incision were sutured and the rest of the wound closed in layers in the usual way without drainage. The loss of blood did not exceed that of the average laparotomy. The patient had a smooth, uneventful convalescence and the chief points of interest were the blood changes. On March 14, 1931, three days after operation, the platelet count was 310,000 per cu. mm., erythrocytes 3,420,000, hemoglobin was 60 per cent (Sahli). March 17, 1931, the platelets were 320,000 per cu. mm., erythrocytes 3,650,000, hemoglobin 60 per cent. March 18, 1931, the count was the same. March 23, 1931, platelets were 340,000, erythrocytes 3,580,000, hemoglobin 60 per cent. March 27, 1931, the platelets were 351,000, erythrocytes 3,730,000, and hemoglobin 65 per cent. The patient was discharged from the hospital March 29, 1931, in good condition and a recent report states that she is in good condition and has no evidence of her former trouble.

CONCLUSIONS

(1) In the study of uterine bleeding a general physical examination should always be made in addition to pelvic examination. Where there is no demonstrable pelvic disease a searching examination of the rest of the body should be carried out.

(2) A complete blood count and hemoglobin estimate or volume should be a routine procedure in all cases of uterine bleeding and where

there is no demonstrable pelvic abnormality, a study of the patient's blood should be made to determine whether a blood dyscrasia exists or not.

(3) Various measures to control bleeding in hemorrhagic purpura such as blood transfusions, intravenous administration of calcium salts, and irradiation of the spleen do not produce any permanent benefit.

(4) Intrauterine irradiation with radium has been ineffectual in my experience and I find this same view expressed in the literature.

(5) The concensus of opinion is that the great majority of cases of chronic thrombocytopenic hemorrhagic purpura are permanently relieved by splenectomy. It is also the general concensus of opinion that splenectomy should not be done in the acute fulminating form of hemorrhagic purpura.

(6) In the chronic type, splenectomy is indicated as soon as the diagnosis is made and the patient brought up to a point of safe operability.

DISCUSSION (*Abstract*)

Dr. W. O. Floyd, Nashville, Tenn.—The diagnosis of these cases should depend upon the clinical history of bleeding, petechial spots forming below the tourniquet, and the great reduction of blood platelets, as well as the marked prolongation of the bleeding time. Dr. Abernathy spoke of the possibility of error in the bleeding time compared with the clotting time, but I think probably he is wrong about there being any error. I have seen these cases in which the difference has been even greater than he reported. In addition to this, the non-retractile clot always makes the diagnosis fairly easy.

Dr. Abernathy did not state that he was able to palpate the spleen in his case. I presume from what he said that the spleen was not palpable in either case.

There is no question about the kind of advice you should give the patient in cases with a palpable spleen. In those in which the spleen is not palpable you may hesitate to advise surgery. You can demonstrate the size of the spleen by x-ray, however, if you cannot palpate it. This will give a fair idea of whether it is enlarged and how much.

It is not necessary to palpate the spleen if you have bleeding from some point of the body, whether it is nose, mouth, uterus or elsewhere. I had a case of a little girl seven years of age who had had typical bleeding for three months, but whose spleen could not be palpated. I operated and found it twice the normal size. Following splenectomy this patient has been well for more than two years. The two important points to consider in these cases is the thoroughness of diagnosis, and then a splenectomy regardless of whether you are able to palpate the spleen or not.

Dr. Augustus Street, Vicksburg, Miss.—I should like to mention a case of purpura hemorrhagica in which splenectomy was done in 1924. Severe attacks of menorrhagia over a period of years had almost exsanguinated the patient. Since splenectomy, seven years ago, she has had no more symptoms. She has gone through an uneventful period of gestation, and been delivered of a normal child. The labor was normal and there was no tendency to excessive bleeding.

Dr. Abernathy (closing).—In these cases the uterine bleeding was the chief symptom, before the appearance of hemorrhagic spots. Of course after the occurrence of hemorrhagic spots we have something to direct us to the diagnosis.

As Dr. Floyd brought out, it is immaterial whether we can palpate the spleen or not. In my cases the spleen was not palpable, although it was enlarged. In each case the splenic pulp was considerably like liver tissue in color and consistency. There were many peri-splenic adhesions. The platelet count and the non-retractile clot were the things on which I based the diagnosis. In a rather thorough search of the literature, I find that the concensus of opinion seems to be that 80 per cent of the chronic type are permanently relieved by splenectomy.

EFFECTS OF THE COMBINED ACTION OF X-RAYS AND ULTRAVIOLET LIGHT*

AN EXPERIMENTAL STUDY

By E. D. CRUTCHFIELD, M.D.,
San Antonio, Tex.

About five years ago we began a study of the effects of ultraviolet light combined with x-rays. Both of these forms of energy fall in the same end of the spectrum and it seemed reasonable to believe that the effect of ultraviolet light combined with x-ray would increase the action of the x-rays. We, therefore, gave to a number of patients whom we were treating for multiple epitheliomas erythema doses.

To some of the areas, we also added ultraviolet light in a predetermined sub-erythema dose. We found that, clinically, the reactions of the places treated with x-rays to which ultraviolet light had been added were more severe and more pronounced than of the areas treated with x-rays alone.

We found also that sub-erythema doses reached a degree of reaction which we believe to be equal to an erythema dose when ultra-

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violet light was superimposed upon the treatment.

Since conclusions from a mild erythema was opened to question, we studied lesions which received considerably more than erythema doses, that is, definitely destructive doses, and we found that these lesions treated with both ultraviolet light and x-rays experienced a more severe and more destructive reaction than when x-rays were used alone.

About this time, Phaler published his "Results in the Use of X-Rays and Ultraviolet Light," and we decided to carry out a somewhat similar control experiment on laboratory animals.

We selected twenty young, full grown rabbits to be used in the experiments. We also selected two rabbits for controls. We treated half of the twenty animals daily with predetermined sub-erythema doses of ultraviolet light for a period of several weeks. We then administered unfiltered x-rays to these animals, using the thighs and ears as sites for treatment. The dose varied from two erythema doses to 32 erythema doses. We then continued to treat the left ear and left thigh in these animals with sub-erythema doses of ultraviolet light and continued this treatment for a period of three months.

Since the left ear received both ultraviolet light and x-rays, when referring to the areas treated with both agents we will refer to the left side to simplify the description. Reaction, as evidenced by edema, swelling, petechial hemorrhages, scaling or ulceration, was more pronounced in the left ear in each instance. We did notice, however, that the hair returned where simple epilation occurred on the left ears earlier than on the right.

In a previous preliminary report we pointed out that in the rabbits receiving epilating doses epilation occurred four days sooner upon the side receiving ultraviolet light in addition to the x-rays.

Our results show that sub-epilating doses could be made into epilating doses by the addition of ultraviolet light; that x-ray reactions were accentuated by the continued use of ultraviolet light; that the prominent vascular and deformitive changes were more pronounced when both agencies were used. And, lastly, on the side treated with ultraviolet light the return of hair occurred sooner than on the untreated side.

At the end of the third month a comparison of microscopic sections from the right and left ear showed an increase in the inflammatory infiltration in the ears treated with ultraviolet light and with x-rays as compared to those treated with x-rays alone.

At the end of thirteen months, the ears were removed and preserved and we can now report the microscopic change after thirteen months.

The end process in the ears treated both with ultraviolet light and x-rays show more pronounced changes in the left ear, which was evidenced by more collagenization and fibrosis. The blood vessels show a more pronounced endarteritis, even to the point of obliteration on the ears treated with ultraviolet light and x-rays than on the ears treated with x-rays alone.

SUMMARY

The combined effect of x-rays and ultraviolet light produces changes which are more severe, more pronounced than when x-rays are used alone. This is true both in the clinical signs and in the microscopic sections. We have taken for our standard for changes produced by x-ray the excellent description of Dr. J. C. Michael in the *Texas Medical Journal* of March, 1928.

DISCUSSION (*Abstract*)

Dr. Jeffrey C. Michael, Houston, Tex.—Dr. Crutchfield's demonstration seems to me to be absolutely conclusive and a complete refutation of statements of Sampson. Sampson made two statements as I recall it: one that if an overdose of x-ray had been given inadvertently the effects could be counteracted by ultraviolet light; the other, that if it were desired to use large doses of x ray, conjoint treatment with ultraviolet light would prevent ill effects. This was a very important doctrine, if true, but, I think, was received with skepticism by most dermatologists.

Shortly after Sampson's article appeared, I tried to assure myself of the validity of his statements by combining ultraviolet with x-ray in treating tinea capitis. Ultraviolet was applied to two points on the scalp (those above the ear in the Kienbock-Adamson technic) and the usual epilating dose of x-ray given to the whole scalp. Without going into details, it may be said that I believe technical requirements were fulfilled adequately to test the effect. Absolutely no difference upon hair fall, regrowth, or texture was noted between the ultraviolet treated areas and the rest of the scalp. Dr. Crutchfield mentions aggravation. None was seen in my cases, which amounted to only four, since I stopped

the work after hearing that MacKee and Andrews were investigating the question.

My conclusion was that no different effect was seen from combining ultraviolet and x-ray in the manner stated above. Dr. Crutchfield's work, it seems to me, definitely settles the issue.

Dr. Charles C. Dennie, Kansas City, Mo.—Rays from whatever source are the same in character, the only difference being the length of the wave. In other words, it is possible to hit a man over the head with a two-foot pole much faster than with one thirty feet in length. The blow would be the same but not so rapid. Recently it has been proven that the alpha rays can be taken away from an electron and again restored. Millikan made the statement then that all waves disturb the alkaline earth metals of the blood stream and of the surface of the body. When one exposes a person to the x-ray a great many more electrons will be displaced from this source than will be by the use of the ultraviolet ray. By means of the ultraviolet ray one will displace some, but the effect will not be so great. When the human body is exposed to any of these rays, energy is released in the body. The amount of radiation reaching the body determines whether tissue shall be stimulated or destroyed. From a physical standpoint alone, using this basis of reasoning, it would be assumed that if one were to expose a patient to a certain dosage of x-rays, and on top of that to ultraviolet light, one would accentuate the electronic action that would take place in that patient. Therefore, it would be reasonable to assume that the ultraviolet ray would increase the activity that was already taking place.

Dr. Harry M. Robinson, Baltimore, Md.—Does Dr. Crutchfield think that it is contraindicated that any patient who has been exposed to ultraviolet irradiation shall receive x ray therapy? Like Dr. Michael, I have given x-ray treatment within a short time of ultraviolet therapy, and, while I know we can not see the good or bad effects solely with our eyes, nevertheless I have never seen any ill effects. I also wish to know whether Dr. Crutchfield thinks that ultraviolet therapy given two weeks or two months before roentgenotherapy would influence the latter.

Dr. Crutchfield (closing).—I think all of you feel that we cannot prevent x-ray burns with ultraviolet light. It required a tremendous expenditure and energy to carry these rabbits through the many necessary months of experimentation. Hence I have given you the results.

We treated half of the rabbits with ultraviolet light before we tried the x-ray, and we could see no difference between those we treated and those that we did not. We drew the conclusion that the effect of ultraviolet light is not lasting. I should have no hesitancy about applying the x-ray within a few hours, or a few days after ultraviolet light therapy.

I think that if Dr. Michael had continued the use of the ultraviolet light daily over a period of months, and used instead of one dose many epilating doses, he would have found some differences. It took us a long time to establish the erythema dose. We treated many rabbits without getting erythema, for we did not realize that it took a tremendous amount of x-ray to produce epilation.

INTERSTITIAL KERATITIS IN LATE CONGENITAL SYPHILIS*

By HARRY M. ROBINSON, M.D.,
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Interstitial keratitis is the most frequent lesion of late congenital syphilis. In the Johns Hopkins Hospital, congenital syphilis in children under the age of 12 is managed by the Department of Pediatrics; older children or young adults are under the care of the Syphilis Division. In a total of more than 500 patients with late congenital syphilis included in our material, almost half came to the hospital because of the development of this distressing manifestation. It is generally accepted that interstitial keratitis always involves both eyes, either simultaneously or in sequence, and that it is one of the most resistant of all syphilitic lesions to treatment. Our own experience in 144 patients leads us to believe that neither of these assumptions is entirely true, and justifies a brief report of our material.

The older literature dealing with the treatment of interstitial keratitis is summarized by Igersheimer.[1] He felt that the introduction of arsphenamine had not improved the results obtainable from the use of mercury alone nor lessened the incidence of recurrences. In an exhaustive paper published in 1925, Carvill and Derby[2] have described 322 cases of interstitial keratitis in full detail, and Carvill[3] in 1931 has further amplified their work. Their report is modern, thorough, and complete. The present paper can do little more than to confirm and point out the importance of their results.

They find that interstitial keratitis makes up about 0.5 per cent of all admissions to a large ophthalmologic service; but that in recent years there has been a significant decrease in its incidence, presumably due to the better prenatal antisyphilitic treatment of pregnant women. They point out that the majority of cases occur in the years between 5 and 15, and that the disease is distinctly more common in females than in males. The most important feature of their work is a comparison of end results in terms of visual acuity, between equal groups of "untreated" and "treated" patients, the untreated group including patients who received only desultory mercurial treatment or none, and no arsphenamine; the treated group including those who received modern intensive treatment with an arsphenamine mercury. In summary form, as ex-

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pressed in *Table 1*, their figures need little comment. In the treated group, 75 per cent have good or excellent vision; in the untreated group, only 56 per cent were as fortunate. They further report that of 17

Table 1

CARVILL AND DERBY'S RESULTS IN PATIENTS WITH INTERSTITIAL KERATITIS, TREATED AND UNTREATED

	Total Cases	End Result—Per Cent with					
		Full Vision	Good Vision	Practical Vision	Fingers	Light Perception	Nil
Treated	178	58	17	20	3.3	0.6	0
Untreated	179	28	28	24	12.8	2.7	2.7

patients in whom the interstitial keratitis was unilateral at the time treatment was started, the good eye remained uninvolved in 16, over periods of time ranging from 5-12 years.

Carvill and Derby's work is sufficiently convincing to persuade the most skeptical of the advantages of modern treatment. Our own material confirms it in full detail, but also indicates, first, that the recognition of interstitial keratitis needs further emphasis, and second, that information as to the satisfactory results of treatment are not as yet widely known or applied.

In *Table II* is shown the incidence of interstitial keratitis in patients of this series by race and sex, and the age at the time of the first appearance of the lesion. Though 45 per cent of

Table 2

AGE AT ONSET OF INTERSTITIAL KERATITIS BY RACE AND SEX

	Total	0-5 Years	6-10 Years	11-15 Years	16-20 Years	21-25 Years	26-30 Years	31-35 Years	36-40 Years	40+ Years
White										
Male	24	2	5	6	7	3	1	—	—	—
Female	36	6	17	9	3	—	—	—	—	1
Colored										
Male	30	3	5	11	3	2	1	2	3	—
Female	41	3	5	20	9	2	2	—	—	—
	131	15	32	46	22	7	4	2	3	1

the series are white and 55 per cent colored, though 41 per cent are males and 59 per cent females, these figures do not indicate that there is any race or sex predisposition to the development of interstitial keratitis. The apparent increased incidence reported in females may be due only to failure to relate the data to the total number of each sex with late congenital syphilis, from whom the patients with interstitial keratitis are drawn. So considered, 20 per cent of all white males with late congenital syphilis in our material, 24 per cent of white females, 30 per cent of negro males, and 26 per cent of negro females have developed interstitial keratitis. These differences are probably not significant.

It is interesting to speculate as to the increased frequency of onset at about the age of puberty. This is equally common in both boys and girls, of either race. Fifty-two per cent of our cases occurred between the ages of 11 and 20. It is of interest to note that the first development of interstitial keratitis occurred after 25 in 10 instances, and in one patient at the age of 42.

In *Table III* appear data showing the duration of the eye lesion on admission to the Syphilis

Table 3

DURATION OF EYE LESION ON ADMISSION

	Total	0-3 Mos.	4-6 Mos.	7-9 Mos.	10-12 Mos.	1-2 Years	2-3 Years	3-5 Years	5-10 Years	10 Years
Previous treatment	44	7	2	2	1	4	9	2	8	9
No previous treatment	88	36	5	3	5	7	4	5	6	17

Division, related to the question of previous treatment. Forty-four patients had been given treatment before our contact with them was established. In many of these, treatment had been quite adequate, and the only evidence of interstitial keratitis was an irremediable scar. No previous treatment had been given to 88 patients. In 36 of these, the lesions had existed for less than 3 months, and practically all of them had sought their first relief at the hands of the Department of Ophthalmology. Thirty-nine patients, or 29 per cent of the whole series, had had interstitial keratitis for more than 1 year, (17 of them for more than 10 years), had consulted numerous agencies for relief, including opticians, optometrists, general practitioners, and even in some instances ophthalmologists, and had received no antisyphilitic treatment whatever. In many, perhaps most, of these patients, the diagnosis of syphilis had never been made. In an occasional instance, the physician had recognized that the lesion was due to syphilis, but had been so impressed with the reported inefficiency of antisyphilitic treatment that he had given none, and had confined his efforts to local treatment only. The outcome was usually disastrous. In practically all patients in whom the lesion was allowed to exist untreated, there

was residual corneal scarring with permanent impairment of vision; and in an unfortunate few, the corneal scar was so dense that the patient was permanently blind.

This can only mean that there is not yet sufficiently widespread recognition of the fact that interstitial keratitis is usually due to congenital syphilis. Rarely, it is true, it may be tuberculous or rheumatic in origin, or due to focal infection. It is practically never due primarily to trauma, though this explanation seems to have been the first to occur to the minds of many of the physicians who saw these patients first. The sudden appearance in a child or young adult of an acute inflammation of one or both eyes, with circumcorneal injection, pain, photophobia, lacrymation, and a steamy ground glass infiltration of the cornea should arouse immediate suspicion of syphilis.

It is rarely necessary to attempt a diagnosis from the eye alone. Most congenitally syphilitic patients with interstitial keratitis show one or more of the classical stigmata. Most of these, if present, are obvious at a glance, without the necessity of undressing the patient. They include, aside from the interstitial keratitis itself, undue prominence of the frontal and parietal cranial bosses, inner ear deafness, saddle nose, Hutchinson teeth or other dental abnormalities, pointed arching of the normally flat palatal vault, the scars of rhagades about the mouth, symmetrical synovitis of the knees, and saber-shins. In our series, eighth nerve deafness and painless symmetrical synovitis of the knees were almost as common accompaniments of interstitial keratitis as pegging of the upper central incisor teeth, the former occurring in 26 instances.

If other stigmata of congenital syphilis are only suggestive, rather than definite, or if they are altogether lacking, as is not infrequently the case, the occurrence of interstitial keratitis nevertheless renders imperative the immediate performance of a blood Wassermann as the first rather than the last step of a diagnostic survey. In this series the Wassermann was positive in 80 per cent of the cases, negative in 20 per cent. Other investigators report a higher incidence of positive Wassermanns. In most of the 23 instances in which the blood Wassermann was negative, the presence of other lesions or stigmata of congenital syphilis made the diagnosis certain. Rarely, it was necessary to investigate parents or sibs for evidences of syphilis in order to arrive at a correct diagnosis. As a matter of fact, the examination of other members of the patient's family is carried out as a routine procedure in order to detect and bring under treatment all infected individuals.

The spinal fluid was examined in 58 patients of this series. Abnormalities were present in only 2 instances, even when eighth nerve deafness was present. This is an interesting side light. Asymptomatic neurosyphilis, so common in early congenital or in early or late acquired syphilis, is almost unknown in late congenital syphilis. The only interpretation to be put upon this phenomenon is that most congenitally neurosyphilitic patients die before reaching adolescence.

The treatment administered to these patients with interstitial keratitis consists of courses of an arsphenamine alternating with courses of bismuth. Old arsphenamine is usually employed, and the average dosage is larger than in patients with less serious or resistant lesions. Children tolerate without serious reaction a dosage level of 0.1 gram per 25 pounds of body weight. Potassium iodide is given simultaneously with arsphenamine at the outset, in a dosage of 3-7 grams a day. Improvement is usually immediate, though slow. Sometimes there is a definite Herxheimer effect and the inflammation in the involved cornea may become temporarily worse. Complete resolution of the active inflammatory process usually occurs in 6-16 weeks, leaving residual opacities of greater or less extent. Even these opacities often resolve further and may completely disappear after a period of several months of continued treatment. Occasionally a resistant case is encountered in which this regime of alternating courses of arsphenamine and bismuth fails to bring about improvement. This can usually be accomplished by intensification of the treatment scheme, sometimes including a change in the drugs employed. For example, we have observed some patients who failed to improve after several weekly injections of arsphenamine, but in whom prompt healing was brought about when silver arsphenamine was given twice weekly and combined with simultaneous intramuscular injections of bismuth and large doses of potassium iodide. We have had no personal experience with the effect of nonspecific measures, such as the intramuscular injection of milk, the intravenous injection of typhoid vaccine, or malaria, though various observers have claimed that more rapid healing was brought about by their use. All patients are managed with the complete cooperation of the Department of Ophthalmology, and local treatment is carried out as these specialists prescribe.

When possible, treatment is continued for a minimum period of 2 years without reference to

serologic improvement or its absence. As a matter of fact, Wassermann-fastness is common in these patients as in others with late congenital syphilis, and no amount of treatment may be successful in reducing the test to negative and maintaining it so. Unfortunately, only 38 of our patients have approximated this optimum amount of treatment, the remainder having voluntarily discontinued, usually because of marked improvement, long before this point was reached.

Forty-seven patients in the series were admitted with acute interstitial keratitis. In every instance there was disappearance of the acute inflammatory process within a period of 6 weeks to 4 months, and vision after treatment was better, sometimes spectacularly so, than before. In *Table IV* appear data as to visual acuity before and after treatment in 18 patients in whom such records are available.

Table 4

VISUAL ACUITY BEFORE AND AFTER TREATMENT IN INTERSTITIAL KERATITIS

	Before Treatment		After Treatment	
	Right Eye	Left Eye	Right Eye	Left Eye
1	Gross objects	Gross objects	20/60	20/60
2	20/40	20/20	20/30	20/20
3	Blind	Blind	Gross objects	Gross objects
4	20/100	20/100	15/100	15/100
5	Fingers	Light perception	20/70	20/100
6	Gross objects	20/50	20/40	20/20
7	20/200	20/200	20/100	20/60
8	Fingers	Fingers	Fingers	Fingers
9	20/70	Light perception	20/40	20/50
10	20/60	20/200	20/50	20/200
11	Blind	Light perception	4/200	7/20
12	20/40	Light perception	20/20	20/100
13	2/100	20/20	20/50	20/20
14	Blind	Blind	Hand movements	4/40
15	10/200	20/20	20/60	20/40
16	10/200	10/200	10/100	10/100
17	20/200	—	20/60	—
18	6/200	20/50	20/40	20/30

In the remaining 97 patients, the lesion had existed for more than 3 months when the patients first came into our hands, and irremediable corneal scarring had occurred. Even here, there was often partial resolution of the scar, and some improvement in vision.

Part of the effectiveness of treatment is measured by its efficacy in preventing relapse. In untreated or poorly treated patients, Carvill and Derby report the incidence of relapse as 27 per cent; in their treated cases as 3.6 per cent. In our material there were 14 instances of recurrent keratitis among 144 patients, an incidence of 10 per cent. In 100 patients in whom the original involvement was bilateral, relapse occurred in 7, the second attack also involving both eyes. The first attack involved only one eye in 44 patients. Seven of these subsequently relapsed, but in only one instance did the recurrence attack the previously uninvolved eye. These patients were followed for periods of time ranging from several months to 8 years. This is ample conformation to Carvill and Derby's contention that adequate treatment of patients with unilateral interstitial keratitis will prevent subsequent involvement of the good eye.

Relapse in interstitial keratitis is a phenomenon which is, at least in some instances, uninfluenced by the amount of treatment given for the original attack. Of our 14 patients with recurrences, 5 had received less than 3 months of treatment; 5 had been treated for periods of time ranging from 6 months to 1 year; and 4 had been intensively treated for 2, 3, 3, and 5 years respectively before relapse finally occurred.

SUMMARY

(1) Interstitial keratitis is equally frequent in white and colored males and females with late congenital syphilis.

(2) A study of 144 patients with interstitial keratitis indicates that the diagnosis is often not made until irremediable corneal scarring has occurred. This may be due to failure to appreciate the importance of congenital syphilis in the etiology of this condition, to unfamiliarity with the common stigmata of late congenital syphilis, or to failure to employ the blood Wassermann as a routine diagnosis measure in such patients.

(3) Adequate modern antisyphilitic treatment shortens the course of the acute inflammatory processes in interstitial keratitis, materially lessens residual corneal scarring, improves the ultimate visual acuity, and lessens the incidence of relapse.

(4) In interstitial keratitis which is originally unilateral, recurrence in the uninvolved eye may be prevented by adequate treatment in a high proportion of cases.

BIBLIOGRAPHY

1. Igersheimer, J.: Syphilis und Auge. Berlin: Julius Springer, 1918.
2. Carvill, M.; and Derby, G. S.: Interstitial Keratitis. Boston Med. & Surg. Jour., 193:403, 1925.
3. Carvill, M.: Interstitial Keratitis. J.A.M.A., 96:1936, 1931.

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DISCUSSION (*Abstract*)

Dr. Paul F. Stookey, Kansas City, Mo.—Dr. Robinson's clinical experiences emphasize the fact that in-

terstitial keratitis does, to a degree, respond to antisyphilitic treatment. Observations concerning the subsequent involvment of the second eye are encouraging. This presentation will be productive of much good in awakening a sense of responsibility in dispensing clinicians, who frequently are extremely pessimistic about the therapeutic possibilities obtainable in the management of this dreaded manifestation of late congenital syphilis.

The pathologic literature is contradictory. However, we can, I believe, state that interstitial keratitis is the response of the cornea to the activity upon the part of the *Spirocheta pallida*. Histologically the classic round cell infiltration, characteristic of syphilis, is always present; and the pathological picture is that of an active manifestation of syphilis. Why should a congenital syphilis latent in the cornea twenty years without the production of any appreciable degree of opacity in the cornea, suddenly become active with a hazy cornea and all the characteristic symptoms of interstitial keratitis? These facts at once bring to mind Levaditi's contention of a resting or granular stage, perhaps a filterable virus as a part of the life cycle of the *Spirocheta pallida*. The clinical behavior of interstitial keratitis with its long period of latency, would, in my judgment, support such a contention.

I have treated five cases of interstitial keratitis with malaria. The results have been excellent, particularly with reference to the shortening of the course of the disease. However, five cases is too small a series and my experience is too limited, to make an optimistic statement as to the influence of malaria upon interstitial keratitis.

Dr. Charles C. Dennie, Kansas City, Mo.—It seems that the syphilographer is not nearly so gloomy in his outlook upon interstitial keratitis as is the ophthalmologist. Many ophthalmologists believe that the modern treatment is not much more effective than the old method of giving iodides and mercury by mouth, and many believe that some cases of interstitial keratitis get well without any treatment. Much work has been done to show that the treatment is of value. Dr. Robinson has shown in a large number of cases that the patients get along better on this treatment than those who receive potassium iodide alone or nothing at all. Dr. C. Morton Smith reported on a large series of cases some years ago that the modern methods of treatment cut at least one-third off the expectancy of the disease. A German worker was able to produce interstitial keratitis in the eyes of rabbits. He demonstrated that in the early stage before the rabbit showed evidence of interstitial keratitis the spirochete was in the cornea. I believe that the eye may carry the organisms in the cornea for long periods of time before any response is brought forth, and then there suddenly occurs an infiltration of plasma cells and so forth. Probably all the time there are a few of those organisms in the cornea. The modern treatment need not be specific for the eye alone, but by raising the tone of the individual as a whole, aid will be given in destroying the spirochete. The general improvement of the patient as well as the secondary reaction will help the keratitis.

Dr. Robinson (closing).—In closing I would like to draw attention to a statement made in the editorial columns of the *Southern Medical Journal* of November, 1931, indicating surprise that syphilis other than that of the skin should be included in this section of dermatology and syphilology, whereas, as a matter of fact, this should be the principal place to discuss syphilis in all its phases.

There is no longer any argument as to who should control and treat syphilis. Surely all agree that this function belongs to the internist; to the medical man who realizes that syphilis of any organ or tissue usually means constitutional syphilis probably involving the whole organism; even though that syphilis be in its earliest phase, a chancre. This should not be out of the domain of the dermatologist who, to know diseases of the skin, must now acquaint himself with medicine, knowing that the skin is intimately associated with the most remote organs that it covers. The only one who should not treat syphilis is that one whose interest does not extend beyond the healing of a lesion of one specific organ, which rarely means curing the whole disease. If other specialists will only see that permanent clearing of a syphilitic eye lesion, bone lesion or stomach lesion, can only be brought about by prolonged systematic and discretely intensive antisyphilitic therapy, then recidives of all types will be less frequent. Only in so far as the function of an organ is disturbed, should extra methods of treatment be resorted to. As a rule, only the ophthalmologist is capable of local treatment of syphilitic eye lesions. Only the orthopedist or proctologist is capable of properly evaluating the damage to and the propping of the damaged organs in their domain. In cardiovascular syphilis, for instance, rest and digitalis are often of more importance than drastic attack with antisyphilitic drugs.

Such good results as we have obtained in syphilitic interstitial keratitis were due to consistent, careful, intensive treatment by the arsphenamines, bismuth, sometimes mercury and often potassium iodide.

TETANUS AND ITS TREATMENT*

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I have chosen this subject for the purpose of calling attention to advances that have been made in the treatment of this once dreaded disease, and to the lowered mortality rate when we use, with good judgment and scientifically, the armamentarium at our command.

Tetanus is an infectious toxic disease caused by the tetanus bacillus, first described by Rosenbach,[3] which enters the human organism through some break in the contiguity of the skin or mucous membrane caused by trauma, accidental or intentional. The bacilli at the portal of entry under anaerobic conditions grow rapidly when the wound is infected by other organisms which act as stimulants or are symbiotic with the tetanus bacillus, such as the *Bacillus prodigiosus*.

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The tetanus bacillus produces, under these favorable circumstances, two types of toxins: tetanolysin and spasmin. The former enters the blood stream and has definite leucotoxic activity; the latter is carried to the central nervous system by the axis cylinders of the neighboring nerves, where the toxin becomes fixed in the nerve cells upon which it has a markedly irritating effect. It thus produces all the convulsive symptoms seen in the disease. The symptoms result from the toxins, not the bacilli; therefore a blood culture is negative. The tetanus toxin is twenty times more poisonous than dried cobra venom.

The part of the body traumatized through which the bacilli enter, and the nerves in proximity to the wounds carrying the toxins to the central nervous system, and the area in the central nervous first affected, determine the localization of the first symptoms.

The toxin has been demonstrated in the blood of man by Nissen[3] (1891) and Schnitzlu[3] (1893). According to Filders,[2] when the onset of symptoms is early, the toxin is demonstrable, but when it is late any toxin which was previously in the blood has already disappeared.

These toxins, as a rule, after a short period become fixed generally throughout the whole central nervous system, and then the symptoms become general.

The disease may be local or general, involving one part of the body or the whole body. When local, it is designated according to the part of the body involved.

The symptoms in general tetanus are both subjective and objective. The subjective symptoms complained of are: thirst, exhaustion, tension and twitching of muscles about the wound, distress of facial muscles, backache, dysphagia, dysuria, constipation, headache, dizziness and insomnia. There is a gradual increase of spasms of muscles around the wound with more pain, which increases upon any type of sensory stimulation. All these become worse until general tetanic convulsions set in.

The objective symptoms are: early increase in pulse rate, sweating, irritability, restlessness, difficulty and inability to urinate, insomnia, twitching of muscles around the wound increased by stimuli, especially the flexors, hyperreflexia, and apprehensive facies.

These symptoms gradually increase in severity as the toxemia increases until muscle groups far away from the wound show the clonic contractions, and then the spasms become general. These may give rise to the typical opisthotonos of tetanus. Face muscles contract, forehead wrinkles, lips are drawn back, teeth exposed, giving the typical risus sardonicus. Trismus or lockjaw may appear early so that the patient cannot open the mouth. The trismus may or may not be complete. Spasms of the larynx and diaphragm occur often. The diaphragm becomes fixed in inspiration during the general convulsions.

Early diagnosis is essential so that the toxin may be neutralized before much of it becomes fixed in the central nervous system. The clinical history, the wound, the incubation period and careful consideration of the predominant symptoms with trismus, risor sardonicus and generalized convulsions will differentiate the diagnosis.

In strychnine poisoning the information that the drug has been taken is important, if it can be obtained, and the absence of a wound usually clears up the case. The spasms are clonic in the beginning and then become tonic; the jaw muscles are, as a rule, never involved. Relaxation of the muscles between spasms is seen in strychnine poisoning and not in tetanus.

Tetany must also be differentiated. In this condition the spasms are confined chiefly to the distal muscles of the extremities. The hands are conical in shape and the fingers are extended as far as the interphalangeal joint and flexed at the ends, the feet semiflexed at the ankles and the toes strongly flexed. Tetany occurs usually in children or is postoperative. If a wound is present, a culture should be made.

Treatment is (1) prophylactic; (2) treatment of well defined cases with serum and drugs.

Sterilization of the wound should be performed as nearly as possible. All foreign material should be removed. Devitalized tissue and skin should be excised and fragments of bone should be cleaned out.

Tincture of iodine when applied to the wound will neutralize the toxin. Peroxide of hydrogen, magnesium peroxide and calcium peroxide are some of the chemical dressings at our disposal; and these liberate oxygen when in contact with the moist tissues. In this way the wound is flushed out and particles are washed away. The oxygen liberating properties of the drugs have a definite destroying effect on *B. tetanus* which is anaerobic.

Ultraviolet rays have been used with some success. An immunity conferred by serotherapy will last from seven to eleven days as a rule. In some of the armies the patient was inoculated the first day and again in ten days with the same size dose. In the curative treatment we have found the intravenous and intraspinal routes to be the methods of choice. Blumenthal[3] (1896) stated that the blood of cases of tetanus, after antitoxin treatment, contained no toxin, but that the toxin was present in the spinal cord. From this he concluded that the toxin in the nervous system was so firmly bound in the nerve structures that it could not be neutralized by the antitoxin. Donitz[3] (1897) found that if the antitoxin is delayed, in experimental tetanus, the animal can be saved up to a certain point by increasing the doses of the antitoxin in proportion to the delay. He concluded that the fixation of the toxin can be broken down by a sufficiently large dose of the antitoxin.

Ransom[3] (1900) showed that after intravenous injection it remained at a higher concentration in the blood than in the lymph, although some of it passed into the lymph in a few minutes. According to Ransom (1900) toxin in the blood is neutralized in fifteen minutes. According to Dehne and Hamburger[3] (1907) concentration of antitoxin in the blood is slow after subcutaneous injection. Dean[3] (1917) found that twelve hours after injection of 30,000 units intravenously in man, one c. c. of the spinal fluid would neutralize 100 times the minimum lethal dose. Filder thinks there may be some urticarial alteration of the permeability of the meninges.

Intraspinal injection of the antitoxin affords one of the best means of fixing the toxin before it becomes fixed in the nerve tissues. If the serum is well diluted it will circulate with the cerebrospinal fluid, and in this manner come in contact with all of the cells of the central nervous system, because it is an established fact that the cerebrospinal fluid bathes all of the nerve cells. It is our opinion that the antitoxin is not given in sufficiently large doses, nor is it repeated often enough intraspinally.

Drugs Used in Tetanus.—Magnesium sulphate, when used properly, is the most valuable drug that we have in the treatment of tetanus. If I were to be allowed only one drug in treating this condition, I would choose magnesium sulphate because I feel that the convulsions can be controlled with it until such a time as is necessary for the antitoxin to neutralize the toxin already in the system. The drug is given intraspinally 1 c. c. of 25 per cent solution for every twenty-five pounds of body weight. Following the injection, the patient should be kept in a slightly elevated position so that there will be no danger of the solution's gravitating too high up the spinal cord where it would involve the respiratory centers and cause death. The drug has no curative effect, but it does control the convulsions and thus prevents exhaustion, the cause of death. Morphine in 1/8 to 1/4 grain doses every three to six hours as needed, chloral hydrate in doses of 20 to 40 grains along with 60 grains of sodium bromide each 4 to 6 hours will be of benefit. A careful watch of the bladder and bowel functions should be kept. No solid food should be given. If necessary glucose is given intravenously and by rectum.

Complete isolation of the patient and restriction of all stimulants should be prescribed.

Our method of procedure in these cases is to do a spinal puncture immediately and inject 1 c. c. of 25 per cent magnesium sulphate for every 20 pounds of body weight followed with 10,000 units of antitoxin intraspinously one hour later. This is given after a necessary amount of spinal fluid has been withdrawn. At the same visit 40,000 units are given intravenously. The patient is kept in the semi-upright position for three or four hours to prevent any accidents. Usually these patients show anesthesia of the lower extremities which may last from twelve to forty-eight hours. The convulsions usually cease at once. The intraspinal treatment is usually repeated daily for three or four days, or longer if necessary. The intravenous injection of 30,000 to 40,000 units is given twice daily. Of course, we use morphine, chloral hydrate, bromides and eserine as indicated.

In addition to the above, we infiltrate carefully around, beneath and in the wound with 20,000 units of antitoxin, repeating if necessary.

Dr. J. Dalton Young, my brother and associate, and I have treated eight cases in the above described manner without a fatality.

REFERENCES

1. Tice System of Medicine, volume 5, pages 25-48.
2. Filder's article in 'A System of Bacteriology in Relation to Medicine," 3:298, Medical Research Council of England.
3. Quoted by Filder.

DISCUSSION (*Abstract*)

Dr. A. A. Herold, Shreveport, La.—While I agree with Dr. Young, in the main, there is one point in treatment upon which I wish to take issue with him. In doing so, I am conscious of the fact that most authorities are on his side. I refer to the intraspinous

injection of the antitoxin, which I consider a useless procedure and a waste of serum. A spinal puncture is advisable in order to reduce the pressure of the fluid and thereby permit more blood laden with serum (given intravenously) to reach the nerve tissue itself, where the toxin is bound up. In addition, in the severer cases, it is well to use the intraspinous route for the injection of magnesium sulphate to control the convulsions.

My contention is that in such diseases as epidemic meningitis and cerebrospinal syphilis, where the organism is present in the subarachnoid space, we are justified in giving the specifics by the intraspinous route; but this does not apply to the disease under discussion. In this contention I am borne out by statistics, which show that the mortality is not lower when the intraspinous method is used. I believe in massive doses of the antitoxin intravenously as early as possible; otherwise, the treatment as outlined by the essayist, but without the intraspinous serum. In this regard I wish to refer to an article in *Annals of Surgery*, December, 1930, in which Dr. A. M. Grace, of New Orleans, reported cases in Charity Hospital for a number of years back. He called attention to the fact that I am trying to bring out, namely: that the mortality rate is fully as high in cases treated with intraspinous serum as in those treated otherwise. He also discussed this subject before the American Medical Association and compared bathing the spinal cord with the antitoxin in these cases to bathing the body with castor oil for constipation.

I think that a distinction should be made between the acute tetanus, with the period of incubation of ten days or less, and the chronic form of longer development; those of over two weeks' incubation probably do as well without serum by any method. For prophylactic treatment I feel that 1,500 units, given within 24 hours of infliction of a wound, usually suffices. However, the injection may be repeated if fear of infection exists.

Dr. Ralph N. Greene, Jacksonville, Fla.—In my community the only case of tetanus that has died since the War was in an unfortunate young woman who was being treated for an allergic condition with a freshly prepared cat hair vaccine. Her condition of health was very poor to begin with and I think that prejudiced her recovery. The routine treatment which we use is just as outlined by the Doctor except that tetanus antitoxin is given subcutaneously, also to perpetuate the effect of that which has been given intraspinously and intravenously.

I want to emphasize the value of the use of magnesium sulphate. In our experience we have had some little difficulty, after giving increased doses, perhaps, in our anxiety to control the tetanic picture. We have encountered respiratory embarrassment and fixation of the diaphragm. It occurred to us that perhaps we were getting a displacement of calcium ions by the administration of too much magnesium sulphate, and experimentally we began preparing for the emergency which we meet in some of these patients who complain of their inability to breathe, particularly at the time of serum administration, and who develop anaphylactic reactions to the administration of antitoxin. We were prepared to give these patients an intravenous injection of calcium and to follow that up by the introduction, intravenously and subcutaneously, of parathyroid extract. By the administration of calcium intravenously patients have apparently been relieved.

We try to emphasize the necessity of quiet in the room. We realize also that with every tetanic contraction of muscle there is a shortening or rather a narrowing of that span between endurance and exhaustability. We attempt to nourish these patients and we overnourish them from the beginning.

I want to reemphasize the fact that in the City of Jacksonville we have lost only one case since the War. I may say, to offset that, having seen meningitis cases often recover during the War, that we have been appalled with the situation of losing every meningitis case we have had.

Dr. A. L. Skoog, Kansas City, Mo.—This is a remarkable report of eight cases treated successfully without a single death. Perhaps I might ask one question. What is the incubation period for each of these eight cases? It is well recognized that short incubation periods present a much more serious outlook.

The importance of prophylaxis has been stressed, and very justly so. That is all-important; and probably if every susceptible case of tetanus following an injury were given an adequate dose of antitoxin, no active tetanus would occur.

I should like to ask the Doctor if he has ever attempted to produce tetanus by the injection of cerebrospinal fluid into animals? I tried it several times, but I failed to produce tetanus by that means.

I believe in giving the antitoxin in very large doses, such as has been indicated here this afternoon, and frequently for at least several days; and I also believe that it should be given both intravenously and intraspinously.

In the convulsive state, rest in every manner conceivable is very important; in other words, keep the room quiet and do not disturb the patient except for absolute necessities.

I think bromides are important drugs, but anyone with a large amount of experience with bromides recognizes that the clinical results are always slow. It takes some little time for real pharmacological action.

I have used sodium bromide on one occasion intravenously. Usually a large amount of intravenous sodium bromide is indicated. We know how difficult it is to make these patients comfortable.

Dr. Young (closing).—I have advocated a combined treatment, both intravenous and intraspinal, large doses of antitoxin intravenously and at least 10,000 units intraspinally every day.

The incubation period of the disease was three to twelve days; the shortest period was three days and the longest incubation period was twelve days. The average, I would say, was around seven to eight days.

We have done no experimental work in the introduction of tetanus by the injection of intraspinal fluid.

EFFECT OF RESECTION OF PRESACRAL NERVE ON VESICAL FUNCTION*

By R. E. VAN DUZEN, M.D.,
Dallas, Tex.

In 1898, Jaboulay suggested paralyzing the sacral sympathetic nerves for relief of certain pelvic neuralgias. He proposed resecting the coccyx and pushing the rectum forward until he was able to show the sacral sympathetic chain and the sacral ganglions. These were sectioned, resulting in temporary retention of the urine and in the relief of pain in the bladder. Following his work, others tried to obtain the same results by injection of air or artificial serum into the pelvic tissues. The results were not satisfactory and the method was soon discarded.

In 1913, Rochet suggested the transperitoneal route for section of the nerves to the lower end of the ureters and to the bladder or the extirpation of the hypogastric ganglion. The latter relieved the pain but gave a permanent retention of urine. This was used for relief of pain in tuberculous bladders.

Leriche, Hallopean, Jianu, and Cotte developed the hypogastric periarterial sympathectomy. In 1925, Cotte published his report on the sectioning of the presacral nerve. He gave the causes in which it was indicated:

(1) Pelvic neuralgias
(2) Vaginismus
(3) Rebellious dysmenorrhea
(4) Uterine hypoplasia with scanty menstruation
(5) Metrorrhagia and leucorrhea of ovarian origin
(6) Sexual hyperexcitability, masturbation, *etc.*

Cotte later suggested its use in intractable vesical pain. Several French observers have made subsequent reports that were conflicting. In America, Rankin reported performing it on September 3, 1929, for Hirschsprung's disease of the colon. Later Rankin and Braasch performed it for retention of urine in tabes. Recently it has been suggested for constipation and for relief of bladder pain.

I performed this operation December 11, 1928, for relief of sexual hyperexcitability and masturbation. There have arisen several complications which others deny or fail to mention, and I wish to report the case in detail. I have had another patient under observation recently upon whom another surgeon performed the section of the presacral nerve for relief of vesical pain.

Anatomy.—(The description by Cotte is followed closely.) At the bifurcation of the aorta into the iliac arteries, the prevertebral sympathetic chain which comes from the inferior mesenteric ganglion gives off some fibers which follow the two vessels and their branches. But the greater part of the nerve fibers continue along the anterior face of the last lumbar vertebra and form the presacral nerve (Latarget). The latter passes over the left iliac vein and promonotory of the sacrum where it divides to form the hypogastric nerves, which pass downward (subperitoneal) into the retrorectal space and where they pass into the posterior and superior cornu of the hypogastric ganglion, which is situated in the superior pelvi-rectal space at the base and upon the external face of the uterosacral ligaments.

Learmonth states:

The hypogastric ganglion receives afferent branches which come from the lumbar and sacral sympathetic ganglion and anterior branches of the second and third sacral. These last fibers reunite on each side in a trunk which forms the sacral erector nerve of Maret; it carries to the pelvic plexus fibers which are homologous fibers of the visceral fibers in the vagus.

Therefore the hypogastric plexus is made up in part from the sacral bundle by the sacral erector nerve and in part from the abdominal sympathetics by branches coming from the inferior mesenteric ganglion. Theoretically it is necessary to visualize the syndrome of excitation and paralysis of the sacral erector nerve. But if the first are well known to physiologists, that is, the part which concerns micturition, defecation and erection; the second, which constitutes the syndrome of the hypogastric trunk are poorly known. Section of the afferent fibers which come from the sacral erector nerve produces grave troubles of micturition and defecation, and suppresses erection. It is not true of the presacral nerve, section of which in most cases causes no appreciable trouble, which justifies operation on the presacral nerve (Cotte). Learmonth says:

"The internal aspect of the hypogastric ganglion is in contact with the rectum, the bladder, the seminal vesicles, the vas deferens, and the ureter."

Where the ureter enters the bladder it is related to the antero-internal part of the ganglion.

Technic of Operation.—Through a midline incision from umbilicus to pubis the abdomen is opened, the bowels are packed upward and the sigmoid retracted to the left. The patient is placed in the Trendelenburg position. At the promontory of the sacrum, the nerve fibers can usually be seen crossing the left iliac vein. The peritoneum is incised and the fibers picked up with a ligature carrier or hook, taking care that all the fibers are included. These are sectioned. There should be no bleeding. The posterior peritoneum is sutured and the abdomen closed in the usual manner.

Miss N. E., age 23, a nurse, gave a history of attacks of pain in the right renal area for several years.

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She had had appendectomy six years before with no relief of symptoms, and several ureteral dilatations with only temporary relief. I was not impressed with any obstruction in the ureter or evidence of stricture in the various pyelograms. After several days observation it was discovered that the patient was a sexual pervert and the pain was a "defense reaction." She was referred to a neurologist but there was no relief of symptoms. After six months observation it was decided to section the presacral nerve as advised in similar cases by Cotte. This was performed on December 11, 1928. Abdominal exploration at that time failed to show any demonstrable disease. The postoperative convalescence was uneventful.

On the second day, the menstruation returned as noted by Cotte. It was necessary to catheterize for a few days. She was completely relieved of the masturbation for two months when it returned during the menstrual period, but after six months she had returned to her former habits. About two months after operation, she reported she had noticed that she had to strain in order to urinate, which had never occurred before the operation. This was not relieved by dilatation of the urethra and vesical irrigation. Three months after operation, a cystoscopy was performed at which time I was struck by the appearance of the bladder. Both ureteral meatus were relaxed and situated near the midline. This was in marked contrast to the normal appearance preoperatively. When the patient was instructed to attempt to urinate, the trigon muscle did not contract. It was necessary to dilate the urethra at first every week and later every four to six weeks to relieve symptoms. She had a severe attack of pyelitis six months after operation. Specimens at that time showed many pus cells and the pyelogram showed a large hydronephrosis on the right side. This was probably due to urinary stasis and reflux into the renal pelvis as a result of the patulous ureteral orifices. About one year after operation a cystoscopic examination showed the left ureteral meatus in normal position and not relaxed. The right was as on previous examination. There was partial contraction of the trigon muscle on attempting to void. About two years after operation both ureteral meatus appeared normal and there was definite contraction of the trigon muscle on attempting to void. During the year previous, the interim between ureteral dilatations had lengthened but it was necessary to dilate to F. 35 or F. 40 to give relief. Small dilatations were ineffectual. In February, 1930, the patient reported for a dilatation. At that time she complained of painful urination and the need of straining. She was given 0.5 c. c. of suprarenalin intramuscularly and instructed to wait thirty minutes before urinating. Much to our delight she reported she was able to void without pain for the first time in three days. She was instructed to take the suprarenalin at intervals of two or three days and observe whether urination was improved.

In August, 1931, she reported that she was entirely relieved after the fourth injection of suprarenalin and had remained so up to that time.

Case 2.—Miss R., age 16, was operated upon by Drs. Folsom and Looney in 1929 for relief of intractable vesical pain. She had had partial resection of the left ureter elsewhere for left megaloureter. The presacral nerve was sectioned as in the previous case. The patient developed a retention of urine and on the tenth postoperative day, the incision began draining urine presumably from the incision in the left ureter. I saw the patient in February, 1931, at which time she was a morphine addict and in uremic coma. Her mother stated that she had had severe vesical and renal pain ever since operation and incontinence of urine. Whether this was a true or pseudo-incontinence from a contracted bladder I was not allowed to determine. The point I wish to stress is she was not relieved of her vesical pain.

I do not wish to condemn an operation or draw definite conclusions from two cases. If I had taken the apparent results before two months after the operation, I could have reported that the sectioning of the nerve was not followed by vesical disturbance. The spastic internal sphincter caused distention of the bladder and because of the patulous ureteral orifices, reflux into the renal pelvis. Specimens of the urine before operation showed no pus and six months after operation the urine showed marked pyuria. This cleared up after dilatation only to return when the bladder did not empty completely. It is also seen by comparing the pyelograms that she developed a hydronephrosis analogous to the patient with hypertrophied prostate.

It should also be noted that there was apparent return of function of the trigon muscle after about two years. How do we explain this return of function? Ney has noted that there was return of pain after six months to a year in his cases. It is possible that we did not cut all the fibers coming from the right side and joining at a lower level than the promontory of the sacrum. It is also probable that a few fibers from the lumbar hypogastric segment of the cord pass by way of the sacral sympathetic chain and nerves to the trigon. Lastly, we have intrinsic ganglia in the bladder wall which may take over the physiological function after the central paths have been cut. Danielopolu has called attention to the fact that probably afferent and efferent fibers pass both by the hypogastric and the sacral nerves, and sectioning the hypogastric may only partially eliminate the pain impulses.

Why have others not noted vesical disturbances in their cases? It is suggested that others might have noted them had the cases been followed and repeated cystoscopies done. Other observers have noted that the ureteral meatus are patulous following sectioning of the presacral nerve. A ureteral meatus remains patulous either because of induration of the ureteral or vesical wall which holds it open or because the trigon muscle fibers which split and pass around it, fail to contract and close it. If it is noted after section of the presacral nerve, the natural inference is that there is a paralysis

of the trigon muscle as in *Case 1*. Again, too, many cases are reported cured a few weeks after the operation or referred to another physician, believing a new condition foreign to the operation has arisen. Often enthusiasm takes the place of wisdom.

Learmonth states that we are substituting one pathological condition for another. If the operation is performed for constipation and dysmenorrhea as suggested by some of the enthusiasts, it is questionable whether the condition produced is not worse than the original complaint.

I am interested to know whether suprarenalin would have relieved the difficulty in voiding if given earlier. Macht has shown that suprarenalin stimulates the fibers of the trigon and relaxes the muscles of the fundus. I was surprised to see the condition improved with so few injections. I had supposed it would only be transient. But if this is shown to be true in all cases we might remove the objection to the operation. Further study should be made on this subject.

CONCLUSIONS

(1) Section of the presacral nerve may be followed by distressing vesical symptoms.

(2) Vesical pain is not always relieved by sectioning of the nerve.

(3) The results are not permanent.

(4) Suprarenalin apparently relieved the spacticity of the internal sphincter in the case reported.

I am deeply indebted to Dr. W. W. Looney, Professor of Anatomy, Baylor University College of Medicine, for his valuable assistance in this work.

DISCUSSION (*Abstract*)

Dr. N. F. Ockerblad, Kansas City, Mo.—Of all the obscure lesions with which the specialist in urology has to contend, nerve lesions of the bladder constitute one of the most distressing chapters. If after a careful check of the urological symptoms, such as any competent urologist does daily, no abnormality is found, one begins to think of two more possibilities, namely: a nerve lesion and a neurotic patient. Of the two, the neurotic patient can lead one further into trouble. Several years ago I had a case similar to the one which Dr. Van Duzen operated upon. There are many points of similarity. My patient complained of pain over her right kidney. I decapsulated the kidney and sectioned the nerves to it; later I did a fixation and finally a nephrectomy. Then the "terrible pain" transferred itself over to the remaining kidney. She also had sexual symptoms and terrible pains in the vagina and bladder. At one time she faked an anuria and kept the hospital in a turmoil for two weeks while she was a patient, complaining that she had passed no urine for eight days. This condition of pain and bladder symptoms lasted for six years. About a year ago her symptoms began to subside and today she is able to work all the time and is quite a normal person. Dr. D. K. Rose, in an illuminating recent article entitled "Clinical Application of Bladder Physiology" says:

> "It is my opinion that the hypogastrics actually close the internal sphincter and dilate the wall and that the pelvic nerve reverses this process. As to sensation, I believe that the hypogastrics carry the sense of overdistention."

If this observation is true it can be seen that an operation for the resection of presacral nerves, such as Dr. Van Duzen describes, might indeed produce an imbalance between the opening and relaxing mechanism and the closing or emptying mechanism of the bladder and it must be remembered that the presacral nerves also send fibers to the rectum and vagina as well as to the uterus and lower ureters. Rose further states:

> "Operations on antagonistic nervous systems in bladder physiology are in their infancy, but it is hopeful to consider decreasing the capacity and raising the intracystic pressure by cutting the sympathetic connection and increasing capacity and lowering pressure by cutting the pelvic or pubic nerve."

Learmonth, in a recent article, has stressed the importance of a thorough knowledge of the physiology of the nervous mechanism of the bladder before attempting resection of the various nerves supplying it. We are indebted to Dr. Van Duzen for a straightforward and honest report of these illuminating cases.

Dr. Rogers Deakin, St. Louis, Mo.—For the moment, at least, neurosurgery in diseases of the lower urinary tract is receiving a great deal of attention. The reporting of all such experiences should in time enable us more thoroughly to understand the neuroanatomic and physiologic make-up of the pelvic viscera. It has been felt, and with abundant clinical evidence to bear it out, that the pelvic nerve, a parasympathetic nerve, carries efferent motor and efferent inhibitory fibers, as well as efferent sensory fibers. Learmonth's case in which traction on the central end of the severed presacral nerve gave rise to a crushing pain in the bladder would seem to prove that efferent sensory fibers are likewise carried by way of the sympathetic nerves of the bladder. Certainly the hypogastric or sympathetic nerves of the pelvic viscera carry efferent motor and efferent inhibitory fibers. In addition, two men, at least, Barrington and Ranson, speak of both motor and sensory fibers in the pubic nerve, a spinal nerve supplying the posterior urethra. It would seem, therefore, with the very evident most intimate association of the three sets of fibers and the extensive crossed innervation, that the complete abolition of sensation from the bladder is well nigh impossible by any procedure short of section of all three sets of fibers, a procedure too formidable to consider. It might be well, in those cases of intractable pain arising in the lower urinary tract, to consider cordotomy, as suggested by Grant in a recent number of the *Journal of Urology*. Dr. Van Duzen's cases point out a danger in interrupting a normal nerve mechanism at the presacral plexus. Braasch and Learmonth have already stated that in their opinion section of the presacral nerve should be reserved for those instances in which the normal mechanism of the bladder has already been disturbed through accident or disease, so that at best one abnormal condition is substituted for another, but it is of such type as to be more compatible with the patient's comfort. That disturbances in the tonus of the lower ureter may follow section of the presacral nerve is not surprising when we consider that the hypogastric nerves supply

fibers to this viscus. In Dr. Van Duzen's first case it seems to me the patulous ureteral orifices may be attributed to a loss of motor innervation resulting from section of these sympathetic fibers. That the relaxation disappeared in time is interesting. Perhaps some of the duties of the severed presacral fibers were in time assumed by the sympathetic filaments which join the hypogastric ganglia direct from the sacral paravertebral sympathetic chains. It is difficult to understand the action of suprarenalin in the reported case. Suprarenalin is generally accepted as a stimulant to sympathetic nerves. In this instance the bladder was devoid of sympathetic nerves except for those which might reach it by paths other than the presacral and hypogastric nerves. In this instance I would rather believe that a viscus had at last readjusted itself to the changed state in its nerve mechanism and to attribute any apparent suprarenalin effect to a coincidental or psyschic phenomena. That the female bladder and urethra should have the same neuroanatomic relationship as the male implies a possible overlapping functional ability on the part of the three sets of fibers. In both male and female, it is perhaps a mistake to attempt too sharply to differentiate the function or anatomic relationship of the three groups of nerve fibers. Dr. Rose, who continues his cystometric studies of bladder function, tells me that he finds it increasingly difficult in his interpretation of curves to separate parasympathetic, sympathetic and spinal fibers from the standpoint of function.

Dr. Jesse R. Stamper, Shreveport, La.—I have been rather enthusiastic about this procedure since it first came out. We dislike to take away from the patient any parts that the Almighty gave her but if we can trade her an abnormal condition that is more comfortable than the one she already has, we have done her some good. My partner has a patient under observation who has become a drug addict from painful bladder with apparently no diseased condition in the bladder. At exploratory operation the only abnormality found was a redundancy of fat tissue around the sigmoid which pressed the bladder to one side and also caused a great deal of pressure on the promontory of the sacrum. A high denervation of the bladder was done, following which the patient's bladder was painless but relaxed. It had to be catheterized for a few days. It is now about four months since the operation and the patient is very much improved. She does not use narcotics and is able to take care of herself. I believe it is pressure from the pads of fat against the sympathetic nerve which causes the bladder pain. I believe that high sympathectomies will greatly help the painful bladder, and that low sympathectomies will do good in some of the inoperable tumors of the bladder where relief of pain is demanded.

Dr. H. C. Gayden, Nashville, Tenn.—I have seen Dr. Learmonth do several of these operations. I think we are operating upon some of these cases without proper cooperation from other sources. Both the cases reported today had bad results. At the Mayo Clinic, many cases were reported with perfect results.

Large bunches of nerves are seen at operation. Learmonth himself could not say at once which bunch he wished to cut, but he employed a stimulating current to determine what to cut before he severed anything. He was able to divide the fibers that he thought to be responsible. Just to go in and cut some fibers should not be attempted. Some men can do work in these specialized fields that others cannot do at all.

Dr. Van Duzen (closing).—I heartily agree that these cases require consultation with a neurologist or anatomist. The work of Learmonth has been cited but in all cases he has insisted on daily catheterization and has failed to show whether the relief afforded was from the nerve section or the catheterization. I could have reported relief in my cases immediately after operation but you can see what the ultimate outcome has been. I do not believe this operation offers much for painful bladders and agree with Dr. Deakin that cordotomy is the best treatment at present.

I believe I can satisfactorily explain the action of suprarenalin in the first case. The trigon muscle had apparently recovered part of its function and suprarenalin (a sympathetic stimulant) accentuated this action.

SHADOWLESS URINARY OBSTRUCTION: SOME UNUSUAL TYPES*

By NEIL S. MOORE, M.D., F.A.C.S.,
and
ELMER E. SEXTON, M.D.,
St. Louis, Mo.

When one reviews the literature on ureteral stone he is impressed with the number of operations which have been carried out in an effort to relieve the symptoms which exist at the time the stone is discovered. This is particularly true of pain in the right side and needless to say most of the operations have been appendectomies with salpingectomy, oophorectomy, and gallbladder operations following in the order named. Considering the number of mistaken diagnoses which are made from symptoms alone when a flat picture may reveal the condition, one can readily see the possibility of a greater proportion of errors in those cases of upper urinary tract obstruction which do not cast a shadow.

We feel sure that patients are now being better examined before operations are carried out. Most first class hospitals require a urine analysis and a blood count, and many require a roentgenogram of the chest and abdomen as a part of the preliminary routine examination. With our present knowledge of gall-bladder visualization more accurate diagnoses of disease of this viscus are being made.

The office of any physician who confines his work to a certain specialty necessarily becomes a concentration point for those conditions which come under that specialty.

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SHADOWLESS KIDNEY CALCULI

These calculi often tax the ability and patience of one attempting the diagnosis, since they do not contain enough calcium salts to cast a shadow on a roentgenogram. It is in these cases that opaque media, either through a catheter or administered intravenously, are of the utmost value in surrounding the stone and producing an area of rarefaction. Very rarely one finds fibrin or albumin stones which cast a negative shadow resembling gas bubbles without the aid of opaque media. We have had our proportionate share of stones elusive to ordinary roentgenographic methods, and it has been our good fortune to find 2 of the 28 cases reported since 1817 of fibrin stones, one of the bladder and one of the kidney. A case of this kind is briefly reported as follows:

A white American born woman, aged 33, was informed that she had pus in her urine seven years previous to our first examination in April, 1930. Attacks of pain developed in the right side after the birth of her second child in 1928. When examined she presented all the symptoms and findings of acute colon bacillus pyelitis with retention in both kidney pelves, absence of dye on the left side and marked reduction on the right. Though we felt she was much too ill to withstand a pyelogram, a flat picture was made, which disclosed numerous negative shadows resembling gas bubbles over the region of the enlarged right kidney and at least four dense shadows in the pelvis. Since she was in poor physical condition open operation was discouraged until she and her husband insisted that something must be done, as the attacks of pain were intolerable. February 7, 1931, we explored the right kidney and found the pelvis and calices filled with more than 100 putty-like faceted fibrin stones which were undergoing calcification. Four or five dense concretions were also removed and a large tube was anchored in the pelvis. During the course of a smooth convalescence more fibrin stones were washed away. The nitrogen retention and blood count improved slowly until on June 27, 1931, we felt that she was able to undergo operation on the left kidney. This was found to have an enormously dilated pelvis with obstruction of the ureter, entirely in the mucous membrane. A probe was easily passed from the ureter into the pelvis, but it could not be passed from the pelvis into the ureter. The kidney was atrophied and functionless, and therefore removed.

The patient presented a very unusual and different condition in each kidney. In spite of this and the operation performed, she is now in a fair state of health.

ACCESSORY RENAL VESSELS

Extra renal vessels are a developmental defect and occur in about 5 per cent of all kidney operations. They are found about equally in the right and left sides and of the upper and lower poles. Those of the upper pole are of no special significance except during operations where severe hemorrhage may occur. It is interesting to note that attention was first called to these anomalies as a warning against accidental hemorrhage. However, we now know that vessels of the lower pole together with accompanying fibrous bands do, in the course of time, impinge upon and compress the ureter resulting in hydronephrosis, due, possibly, to the upright position that man has assumed.

We know that the symptoms usually manifest themselves in the second and third decade, though no age is immune if the condition exists. The commonest complaint is pain in the affected side when sitting or standing. It is nearly always relieved when in the recumbent position. As time goes on the stagnant urine becomes infected usually with *B. coli*, but occasionally with tubercle bacilli, or stones may develop when there are the additional symptoms of infection and more pronounced obstruction. It is not unusual to see one of these poor unfortunates who has taken many kinds of medicine, used all kinds of appliances, both mechanical and electrical, and finally in desperation tried the ministrations of many different cults. Occasionally there is a history that a roentgenogram was made, but since the kidney was only a little enlarged and no stones were observed, nothing more was done.

W. C. Quinby, in a paper before this Association at the Miami meeting, called attention to a point in diagnosis which we have found useful. This is simply a break in the continuity of the ureterogram when the patient is in a sitting position.

It is my sincere belief that many of these cases are benefited or entirely relieved, when seen early enough, by means of dilating or indwelling catheters, which change the course of the ureter. If, however, symptoms persist or the hydronephrosis is of large size, surgical intervention becomes necessary. Since the renal is an end artery, merely ligating and bisecting the artery is usually followed by atrophy of that part of the kidney which the vessel supplies. Many plastic operations with or without fixation of the kidney have been suggested, provided the kidney is sound and very little infection exists. Most of them are successful.

In my own work of ten years' duration we have found nine cases of lower pole vessel as the direct cause of hydronephrosis. There were 4 males and 5 females. One case was complicated with tuberculosis and two with stone. The earliest symptoms began at the age of four in a boy who jumped from a swing to his feet and

developed pain in the back. I first saw him at the age of 19, when it was necessary to remove the kidney. The longest duration of symptoms was 17 years. In this case symptoms began at the age of 10. The oldest patient was 53 years. Every case except one has been on the left side and eight were so badly infected and the kidney so badly damaged that nephrectomy has been necessary, as fortunately the opposite kidney was sound. The one right-sided case was complicated by severe hemorrhage which occurred during the attempt to remove a stone from the pelvis. All are now living and only one has shown any tendency to similar symptoms on the opposite side. This patient was operated upon less than a year ago and we believe the pain is compensatory hypertrophy, as a pyelo-ureterogram recently made is normal.

ADHESIONS ABOUT THE URETERO-PELVIC JUNCTURE

In our experience ureteral kinks associated with ptosed kidney are usually complicated with adhesions which must be corrected before the kidney is fixed. Failure to do this often defeats the purpose of the operation. Time and space do not permit a discussion of our very satisfactory results in a fairly large series of nephropexies. Three different types of adhesions have been encountered about the pelvis. In each case, the kidney was not ptosed.

Case 1.—A white unmarried woman, aged 34, sustained a shock when she suddenly sat on terraced steps and experienced pain in the left costo-vertebral angle. There was no blood and no urinary disturbance. The pain continued, associated with loss of weight and a certain amount of what appeared to be neurosis. A left uretero-pyelogram disclosed a sharp curve in the ureter at the level of the lower pole of the kidney. The urine and function of both kidneys were normal, except for moderate retention in the left. After elimination of all other conditions which might cause such symptoms the left kidney was exposed, when a number of adhesions were found binding the ureter to the lower pole of the kidney. There was moderate dilatation of the pelvis. The adhesions were broken free and the retention was relieved. Though the kidney was not movable it was fixed in position. The patient made an uneventful recovery and has had no more trouble over a period of seven years.

Case 2.—A white widow, aged 43, complained of pain in the right side and back for some two or three years, aggravated when she was in the upright position. She was profoundly neurotic. There were no urinary symptoms. Two abdominal sections had been previously made when the appendix, right ovary and tube were removed and the uterus suspended. The gallbladder showed no abnormality. Urograms disclosed a moderate retention in the right renal pelvis, but no cause for it could be found. The kidney was not materially ptosed and the function was normal. After observing this patient for some time and dilating the ureter without results, the kidney was exposed. The pelvis was moderately dilated to a point at its junction with the ureter. Here was a definite band of adhesions surrounding the ureter and attached to the peritoneum. After the adhesions were released a white band of tissue was observed intimately associated with and completely encircling the ureter, appearing very similar in a small way to pyloric stenosis. The band was superficially cut across at two points and the kidney anchored, though it was already in good position. Our efforts have been rewarded with a clinical cure.

Case 3.—A white married woman, aged 37, complained chiefly of a feeling of malaise, loss of energy and lack of endurance associated with headaches and a variable amount of gastrointestinal disturbance. There had never been any pain referable to either kidney, though at times there was some dysuria. The first time she had any knowledge of her kidney disease was when she entered a hospital in Detroit, Michigan, for a tonsillectomy, and pus was found in the urine. There was no appreciable relief following the tonsillectomy. Urological examination in our office disclosed a 60 to 90 c. c. retention in the left pelvis with a markedly decreased function. A partially satisfactory pyelogram showed a dilated left pelvis and sacculations in the calices. The urine contained pus, grade one, and *B. coli*, grade four. There was no improvement following repeated lavages. The right kidney remained normal. May 29, 1931, the left kidney was exposed and the pelvis found markedly dilated. This was caused by a long, dense band of adhesions extending from the lower pole of the kidney to the ureter, then encircling the ureter, and resulting in almost complete occlusion. The appearance of this band and the ureter was not unlike that of tenia in the colon. It extended through the wall of the ureter and was so long that plastic repair seemed out of the question. Since the opposite kidney was sound, a nephrectomy was performed. This patient has been in better health since the operation than she had been for years.

STRICTURE OF THE LOWER END OF URETER

These strictures, as we know, may be congenital or acquired and the symptoms may appear at any age. Naturally anyone interested in the relief of obstruction at the uretero-vesical orifice as I have been would find a great number of such obstructions. It is my belief that atresia of this small opening exists with a definite symptom complex a great deal more frequently than some are willing to admit. The presence of such obstructions can only be suspected until certain findings are elicited on cystoscopic examination, such as the failure of a ureteral catheter to pass upward or the definite hang observed on withdrawal of the catheter, fortified with urography through the retrograde catheter or by intravenous administration. Again, time and space do not permit a thorough discussion of this important subject and we are forced to refer the reader to more recent literature. Suffice it to say that clinical results with the high frequency meatome which one of

us (Moore) devised have been exceedingly satisfactory.

A case of ureteral stricture was observed in a white man, married, childless, aged 50, merchant by occupation, who first had an attack of pain in the left back some six months before a second attack, when we were privileged to see him in May, 1930. The first attack disappeared after injection of morphine and was not considered further by himself or his physician, but the second, which came on spontaneously, was not relieved by any of the simpler measures, but remained continuously. When first examined there was a large palpable, smooth mass in the upper left abdomen extending to the corresponding iliac crest and protruding into the left costo-vertebral angle. There was neither fever nor chills. The urine was virtually clear and the blood count was within normal limits. A plain roentgenogram showed a large cloudy mass with the general outline of a massive kidney, extending well up under the costal margin and below the iliac crest. There were no definite stone shadows. Cystoscopically the bladder was normal, and the right ureter was easily catheterized, revealing normal urine and increased function. The smallest bougie could not be introduced through the left ureteral orifice.

A left lumbar incision was made and the large mass was found to be a subcapsular hemorrhage. As there was no free bleeding, ample drainage was instituted and the patient put to bed for a week, during which time his general condition and blood picture improved. We then did a secondary nephrectomy and found the kidney atrophied and ruptured. The hemorrhagic cavity corresponded to the x-ray picture. All clots were removed and the incision was closed with drainage. A very competent internist had examined the heart and found it in fairly good condition when he first entered the hospital. The operation was not prolonged under ethylene anesthesia and his condition was excellent when put to bed, yet the patient died seven hours later of acute cardiac dilatation. There was no autopsy. Consequently, we do not know the exact cause of the obstruction other than that it was confined to the very lower end of the ureter.

SUMMARY

(1) Four different types of urinary obstruction with their variations are presented. They represent a fairly good cross section of those uncommon conditions which yield little, if any, information when viewed from the standpoint of plain roentgenography.

(2) The etiology is frequently elusive and the symptoms are equally puzzling.

(3) Diagnoses are determined many times with much effort and require a complete physical and urological examination, including a thorough study of the urine and blood. We have no hesitancy in stating that a cystoscopic examination is necessary, though intravenous urography is a very valuable adjunct. The true condition is occasionally revealed only after exposure of the kidney.

(4) Finally the treatment consists of relief of the obstruction and restoration of function regardless of the method used. Conservation of a kidney should always be uppermost in the operator's endeavors, though a good clean nephrectomy is often preferable to a poor plastic operation resulting many times in nephrectomy after the opposite kidney has been irreparably damaged.

REFERENCES

1. Quinby, W. C.: Clinical Picture Hydronephrosis in Children and Young Adults. Sou. Med. Jour., 23:328-337, April, 1930.
2. Quinby, W. C.: Factors Influencing the Operative Procedures in Hydronephrosis. J.A.M.A., 93:709-710, Nov. 30, 1929.
3. Eisendrath, D. N.; and Strauss, D. C.: Surgical Importance of Accessory Renal Arteries. Trans. Amer. Urol. Assn., 4: 171-179, 1910.
4. Rupert, R. R.: Further Study of Irregular Kidney Vessels. Surg., Gyn. & Obst., 17:580-585, 1913.
5. Mayo, W. J.: Relation of Anomalous Renal Blood Vessels to Hydronephrosis. J.A.M.A., 52:1383-1388, May, 1909.
6. Eisendrath, D. N.: Variations in Renal Vessels. Amer. Surg., 71:726, June, 1920.
7. Strassman, Paul: Unterbindung dei Aberrierenden Nierengefabe bei Schmerzhafter Harnleiterbehinderung. Zentrablatt fur Gynakologie, 53, part 3, 2514-2520.
8. Mathe, Charles P.: Role of Aberrant Vessels in the Production of Hydronephrosis. Jour. Urol., 19:211-240, 1928.
9. Sanford, H. L.: Anomalous Renal Vesse's. Jour. Urol., 19: 421-429, 1928.
10. Crabtree, E. G.: Early Hydronephrosis Associated with Aberrant Arteries. Boston Med. & Surg. Jour., 189:505-507, 1923.
11. Crosbie, A. H.: Kinks of Ureter Due to Aberrant Vessels. Boston Med. & Surg. Jour., 188:678-687, 1923.
12. Bevers, E. C.: Hydronephrosis Due to Aberrant Renal Arteries. British Med. Jour., 1:718-719, 1922.
13. Pierson, Edward; and Barney, J. D.: End Results of Operations for Nephroptosis and Aberrant Renal Vessels. New England Med. Jour., 201:568-574, 1929.
14. Bremer, J. Lewis: The Origin of the Renal Artery in Mammals and Its Anomalies. Amer. Jour. Anat., 18:179-200, 1915.
15. Moore, N. S.: Uretero-Vesical Opening: Demonstration of Fulgurating Incisor. Jour. Urol., 16:541-544, 1926.
16. Moore, N. S.: Non-Calculus Obstruction of Upper Urinary Tract. Jour. Missouri State Med. Assn., 27:112-117, 1930.
17. Moore, N. S.: Obstruction of Upper Urinary Tract from Surgical Standpoint. Jour. Missouri State Med. Assn., 22: 50-54, 1925.
18. Moore, N. S.: Ureteral Meatotomy: Clinical Evaluation. Jour. Urol., 26:519-528, 1931.
19. Moore, N. S.: Abstract: Technique Ureteral Meatotomy. Internacia Medicina Revuo, 355, Jan., 1928.

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DISCUSSION (*Abstract*)

Dr. Henry Douglass, Nashville, Tenn.—In my experience ureteral obstruction is not uncommon. The most frequent cause of the obstruction has been stone. Stricture of the ureter has been the second most common cause of obstruction and the great majority of strictures have been tuberculous in nature. Nearly all of the strictures I have seen have been in the lower half of the ureter. Rarer conditions producing obstruction have been ureteral kinks and anomalous blood vessels. Such obstructions are, of course, confined to the upper ureter.

It is not always easy to interpret the findings in these patients. Obstruction to the passage of a catheter does not always mean real abnormality in the ureter. I suppose that at times we all have been unable to pass a ureteral catheter in the first attempt,

only to find later that it will go without the least difficulty. Again, in examining x-ray evidence, we see kinks in the upper ureter which are sometimes due to deep inhalation while the plate is being exposed. I have been able to pass a catheter without meeting obstruction through a ureter which was kinked to such a degree that hydronephrosis had resulted. A most important point to consider in the interpretation of the findings is the amount of dilatation of the pelvis and ureter above the point of obstruction.

Dr. N. F. Ockerblad, Kansas City, Mo.—There are numerous instances of shadowless stone in the ureter. One of my patients with severe kidney colic had a four-plus Wassermann. At necropsy we found that the pain was due to a big infarct in the kidney. An infarct of the kidney can cause stricture of the ureter due to spasm, which makes it impassable.

Dr. Thomas D. Moore, Memphis, Tenn.—Dr. Moore did not mention obstructions caused by extraureteral inflammatory processes. A young woman with pain in the right loin, with hydronephrosis and hydroureter, was found by us to have a subacute appendical abscess, the ureter being involved in the inflammatory process. The appendix was removed, the abscess evacuated, and drainage established. The patient made an uneventful recovery. A right pyelogram repeated several weeks later was normal.

Urologists in general, with their instruments of precision and other means of accurate diagnosis, are inclined to be somewhat critical of their friends engaged in general surgery. These shadowless ureteral obstructions are very easily overlooked. In the practice of urology we must watch ourselves that we, in turn, may not be subjected to criticism by others for diagnostic errors.

Dr. Abraham Mattes, New Orleans, La.—In the treatment of urinary calculi, particularly that type confined to the bladder, we often have recurrences over short periods of time. Several years ago the value of solutions of papain in dissolving mucus and fibrin was reported. We have used this treatment in many cases of soft calculi and crystal and salt impregnated debris and have seen these shadows melt away. We have used it in cases of pyonephrosis with shadowless and soft calculi and found it of value. In encrusted cystitis quickest results are obtained. This is something which may be employed to cut down the recurrences of urinary calculi.

Dr. Moore (closing).—In the obscure conditions which tax our ability to diagnose, in many of which the symptoms point to an abdominal condition, we urologists can accomplish much.

I have used papain in vesical blood clots with very satisfactory results. Some weeks following pyelotomy and drainage of the fibrin stone case, referred to in the paper, there was return of the obstructive symptoms. Feeling that the obstruction was probably due to the formation of another fibrin stone, we in desperation injected a few c. c. of 15 per cent papain (caroid) solution. There was a severe reaction from which the patient finally recovered. It is quite likely that some benefit was derived from the treatment. That case is extremely interesting from the standpoint of rarity of kidney fibrin stone, and the unusual amount of surgery the patient has withstood considering her poor physical condition.

DIFFERENT METHODS OF INTERNAL FIXATION OF FRACTURES*

By I. A. Arnold, M.D.,
Louisville, Ky.

The subject of fractures is of great importance because of the deformity and disability which they may cause, and the increase of malpractice suits as the result of the disability. While malpractice suits do occur where fractures have been treated according to the most modern accepted methods, as we never get 100 per cent perfection in anything pertaining to the practice of medicine or surgery, yet the great majority of suits are filed because of neglect or incompetency of the surgeon in the case.

Not only is the medical profession as a whole under a misapprehension about many aspects of this subject, but both the hospital surgeon and current surgical writings are often inaccurate and correspondingly unsound in advising treatment.

In the treatment of fractures one is confronted with the statement not only by the laity but by members of the profession that there are many different methods of handling such injuries; that Dr. A. treated Mrs. B.'s broken arm and Dr. D. treated Mrs. M.'s arm a different way. That is the reason Mrs. B. did not obtain the excellent result that Mrs. M. did. To a certain extent this is a fact. I hope to refute this statement to a considerable degree in discussing the treatment of fractures by the open method.

In the treatment of fractures, as in many other things medical and surgical, there is often more than one method of approach, and treatment of the same condition by different methods may secure the same results, depending upon the fact that one surgeon is familiar with one type of treatment and one with another, and each man does the best work by employing the method with which he is most familiar. However, very few fractures are alike. They differ as to location and type. Therefore, it would be incorrect for one to call one treatment a different method, when the fact is that there are different conditions to be treated.

In my contact with fellow surgeons and orthopedists, I find very little variation in the fundamental methods of treatment of fractures. The main difference is in conditions and cir-

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cumstances. So we may consider that the types of treatment have been reduced to the minimum and the aim of all is to restore function with as little deformity and malposition as possible, compatible with the circumstances and conditions of the patient.

First, the diagnosis of all suspected fractures requires careful x-ray examination. This is not always necessary to diagnose the fracture, but it is extremely important to determine the type of fracture present, as whether it is oblique, comminuted, multiple or impacted. On this accurate diagnosis, in the hands of one who is capable and familiar with fractures in conjunction with the economic and physical condition of the patient, the plan of procedure depends.

Second, every patient with a fracture should receive treatment adequate to secure the best union in a correct position. It is not always necessary to institute treatment at once. In some cases it is better to wait a week or ten days. Especially is this true in the open method of treatment.

When the plan of procedure is open operation, a few pertinent questions arise which must be considered and answered.

(1) Why open operation and what are the average results?

(2) Which method of treatment gives the best results?

(3) What is the relative value of the different types of material used?

(4) Is it necessary to choose one of these methods to the exclusion of others?

In answer to the foregoing questions, I should like to state in the beginning that I do not advocate opening a fracture, in other words, making a compound fracture of a simple one if reduction is possible with proper alignment, good apposition and safety to the patient. However, in the hands of a competent bone surgeon, in a properly equipped hospital with surroundings to insure perfect asepsis, I have no hesitancy in opening a fracture in order to secure perfect apposition and functional results. Barring infection, the average results under the conditions just stated are far superior to the non-operative and often haphazard methods of handling a fracture.

There are a number of different methods of internal fixation, such as sliding autogenous graft, Lane's plate and bone pegs. The results obtained depend entirely upon the type of fracture and on the judgment of the operator as to which of these different materials is best suited to the case.

Relative Value of the Different Types of Material Used for Internal Fixation.—The Lane's plate or metal fixation should not be discarded, as many are advocating at present. It has a field of importance in fracture of the femur and other long bones where strength is required. Also in multiple fractures, as of the femur where there are several pieces of the bone involving from six to ten inches of femur, it is one of the best methods that we have for holding these fragments in position and at the same time producing stability of the limb. It is also useful in compound fractures where infection has occurred with considerable loss of bone tissue, where it becomes necessary to hold the fragments in alignment and preserve the length of the fractured member until infection can be overcome and regeneration of the tissue has taken place and a further operative procedure is advisable, such as bone grafting. I have used a Lane plate in conjunction with a sliding autogenous graft spanning a space of one to two inches to produce stability at the site of the fracture, as it is absolutely necessary to have complete immobilization in order for the graft to function. Otherwise, the graft will fasten itself at one end and remain loose at the other.

The autogenous inlay graft is ideal if complete immobilization can be secured, where too much strength is not required, and to span a space where considerable osseous tissue is absent. The autogenous graft, contrary to some opinions, has osteogenetic properties and functions as living bone and not as a mere scaffold for bone tissue to build upon.

The autogenous intramedullary graft approaches the ideal, but there are some objections to the method. If not properly applied, the graft will produce occlusion of the canal. I have not found that it interfered with union in any case in which I have used it.

Pedicle graft is very useful in fractures of the inferior maxillary or in any situation where bone can be removed and placed over the site of the fracture or loss of substance. The advantage of this graft is that there is more assurance of its living and it will also aid materially in regeneration of the osseous tissue.

The massive inlay has its field in such cases as loss of tissue of the long bones, and when it lives it certainly saves considerable time in regeneration of the bone, and convalescence of

the patient is shorter than with an ordinary small graft. Cortical graft may also be used advantageously, although I seldom use one, for the reason that it makes a considerable "lump" at the site of the fracture and if close to the surface it is unsightly and often interferes with the function of the musculature and blood and nerve supply. The point from which the graft is selected depends largely upon the bone that is fractured and the regeneration demanded of the graft. If possible, in case of the long bones, I obtain the graft from the same bone either above or below the site of fracture. The tibial graft has the greatest strength and being of hard, compact bone, is capable of living longer without nourishment. In fractures of the maxillary bone and cranium the rib is preferred, which seems to be the most viable of all bone tissue. I have used it to cover large cranial defects and it has never yet failed to unite.

The beef bone peg or other foreign substance has been severely condemned by some surgeons, but the beef bone peg properly applied will produce the most uniformly satisfactory results. This method of internal fixation has the required strength, holds the fragments in perfect apposition, and if properly inserted in the canal does not interfere with regeneration of the endosteum. It produces complete immobilization and requires less external fixation, such as prolonged application of the plaster-of-paris cast. The patient is completely relieved of pain and the duration of disability is considerably lessened. I do not approve of the insertion of a long beef bone peg in one end of the bone and merely a "stub" in the other as some surgeons advocate, as complete immobilization is not produced and the canal is unnecessarily blocked. The bone peg must be inserted equidistant on either side of the fracture. If I had to discard all other materials and treat routine fractures, I would choose the beef bone. I have used it many times during a period of eighteen years, and thus far my results have been better than with any other method employed.

Another disputed point is the question of the absorption of beef bone pegs. In many cases they are absorbed within one to five years; in others, they are not absorbed. I have some slides which I will show where pegs from the same piece of bone were inserted in the case of a boy ten years of age and also in an old lady. Sixteen months afterward the picture of the boy shows entire absence of the peg. Eighteen months later the picture of the old lady shows no evidence of absorption. The ivory plate may be included in the same class with Lane's plate, and in my opinion it is too bulky a mass to be used in a fracture.

Wiring has very little place in the treatment of fractures except in conjunction with internal fixation, such as holding small fragments in contact with a larger piece as in fracture of the jaw. It does not immobilize the fracture and it seems useless to insert a foreign substance which has little value.

Nails are useful in certain cases such as fracture of the condyles of the femur or nailing the head of the humerus, but should not be used in any intracapsular fracture of the femur, as was formerly the custom.

Kangaroo tendon may be used in some fractures, especially those of the stellate type where the tendency is to remain in alignment. The kangaroo tendon will often aid in holding the fragments in direct apposition until the wound is sutured and external fixation applied to hold the fragments in apposition and alignment.

There are semi-internal fixation methods which are used quite extensively by some operators with excellent results. Personally, I have employed these to a very limited extent. They are mentioned as "semi-internal fixation methods" for the reason that while their points of contact are within the bone, the adjustment and stabilization of the fracture is accomplished externally by set screws and extension plates. I have reference to such devices as Grant's pins, which are screwed in the bone on either side of the fracture, the wound being closed around the pins and then adjustment made by external movement of the pins which are fixed at that point. There are also numerous other hooks and appliances which have for their object the same function, that is, adjusting the fragments and holding them in position. The main objection to these methods is that they leave a sinus communicating with the bone and the surface which increases the likelihood of infection from the open wound. One advantage of such devices is that they can be removed without making another incision to the bone after union has occurred; but in my opinion the danger of infection outweighs the advantage of the easy removal.

The foregoing methods may be classified in the following way: the autogenous bone graft is best suited in case of vicious union, fibrous union, and the loss of considerable bone substance, where additional osteogenetics are de-

sired and great strength or strain is not required.

The beef bone pegs should be used where more strength is necessary with long continuous treatment, and a plaster-of-paris cast is contraindicated.

Lane's plate or other metal fixation should be used where strength is necessary, as in multiple and comminuted fractures of the long bones and in the presence of suspected infection in open wounds where loss of osseous tissue is considerable and the contour and length of the fractured member is to be maintained. They should not be used in fractures of the smaller bones or where there is not sufficient tissue to cover the metal. Also, plates are contraindicated where the tendency of the fracture is to longitudinal separation.

Nails may be used in fractures of the condyles or where there are small pieces of bone which need only to be "tacked" into position.

Wire may be used in the smaller bones to hold the fragments in direct apposition where complete immobilization is not necessary.

Kangaroo tendon or other durable suture material may be used in smaller bones in fractures requiring only temporary internal fixation, the alignment and immobilization being dependent on external appliances.

The cortical massive graft, in a general way, comes under the same requirement as the autogenous graft.

The pedicle graft is used where it is possible to change position of the piece of bone with its attachments to the site of fracture, but its field is necessarily limited.

It is unnecessary to discard other accepted methods of internal fixation, but rather we should choose materials to be used to suit the type of fracture with which we are dealing. There are no definite rules.

In conclusion, permit me to recapitulate: in the treatment of a suspected fracture, make as little manipulation as possible in trying to complete the diagnosis. Instead use the x-ray. Have pictures made at the angles that will give the information desired, that is, the exact type of fracture with which you are dealing. One who is familiar with treatment of fractures can, in the majority of cases, readily determine whether open operation is indicated or whether reduction can be accomplished and the position of the fragments be maintained by the usual methods. This is a very important factor, as often the trauma to the soft structure produced by attempted reduction is far greater than that caused by the injury at the time when the fracture was produced.

A word of caution may be proper at this point. One must consider, when operating upon bones, that he is dealing with living tissues that are subject to the insult of trauma and should be handled with extreme care and as little traumatism as possible. The surgeon should keep constantly in mind that he is dealing with a living subject and not inanimate material; also, that the tissues are susceptible to infection. Extreme asepsis should be used. In the majority of cases, whatever method be used, it is unnecessary to introduce the hand into the wound. Do not handle the part of the instrument that is inserted into the wound. If it becomes necessary to "feel," it is very easy to wrap the finger or hand with gauze, which is then discarded. A sponge should be used only once. I know of no other surgical procedure in which team work of assistants and nurses is more important than in bone surgery. These should be taught not to talk during an operation, as doubtless many infections come from the mouth of the operator or the assistants. The nurse should hand the surgeon an instrument with another instrument, not with the hands. If the precautions just mentioned be observed there will be little cause to fear infection in bone surgery. Bone surgery should be undertaken only by those who are well trained surgically and mechanically inclined. In such hands I advocate open operation in fractures that cannot be reduced by simple methods. Apposition and alignment will be perfect, recovery more prompt, there will be less pain, and the functional results better.

DISCUSSION (*Abstract*)

Dr. W. B. Owen, Louisville, Ky.—One should use the principle with which he is familiar and the principles which produce the best results in his hands. Since Dr. Arnold has emphasized the employment of the intramedullary beef bone peg, I shall briefly outline my experience.

I have had no experience in placing beef bone pegs in an intramedullary canal. My observations are confined entirely to their removal for non-union, infections, or both.

Ninety-five per cent of the non-union cases that we have had in the past three years followed open operation and consisted of the employment of intramedullary beef bone pegs. They involved the following bones: humerus, radius, femur (shaft and neck) and tibia. Three amputations of the leg were necessary.

I have under observation at the present time two cases in which there is no union of the humerus. I

also have under observation an ununited fracture of the neck of the femur. I am not encouraged to try this procedure. It is physiologically bad, although mechanically good.

Dr. C. N. Carraway, Birmingham, Ala.—During my thirty years of industrial surgery I have seen a large number of fractures and have come to the conclusion that a large percentage of non-union in fractures is due to motion through the line of fracture which keeps the callus broken.

In a series of 500 fractures of the femur treated during the last seven years I have not had a non-union. I have had several delayed unions. I seldom use foreign material of any kind in fractures. I have obtained best results from autogenous grafts in closed fractures. I do not use any internal fixation in compound fractures, but prefer waiting until the soft tissues have completely healed, and then grafting.

I have had 16 simple and comminuted fractures that could not be reduced by the closed method. I operated upon them in extension, in bed in their room, in a modified Hodgin's splint, simply by incising the skin and separating the muscles over the site of fracture and then grasping both fragments with a pair of lion-jawed bone forceps and properly adjusting the broken end interlocking the fragment. When there are several fragments of bone I have used metal bands. We have not had a single case of infection or a non-union or displacement, and the results have been satisfactory in all cases.

Dr. A. C. King, New Orleans, La.—The man who tells us he has no trouble with fractures handles very few fractures.

Dr. Arnold has called attention to the fact that the asepsis must be absolute. The late John B. Murphy referred to "superlative asepsis" and it must be superlative or our results will be unsatisfactory. Recently I had a letter from one of my interns who had taken a good deal of interest in bone work. He had become associated with two other physicians and tried to show them some of our methods here. He said: "I got a pair of gloves on one of these gentlemen. On the other I got neither cap, gown, nor gloves." That was the wrong kind of "superlative asepsis."

A man who does this work should be a good mechanic. I have seen men do open reductions who mishandled their instruments pitifully.

No man who understands the danger of open work goes into it blindfolded. He does it when he has to and at no other time.

Dr. R. C. Robertson, Chattanooga, Tenn.—It is unwise to advise widespread use of fracture fixation methods which are not in the main applicable to the general surgeon who is doing fracture work. Methods which succeed in the hands of men highly skilled in bone surgery will usually, in the hands of one less skillful, fail to produce the desired results. The cases which come under my observation after internal fixation has been applied do not show the uniformly good results that have been shown here this morning.

Dr. Owen expressed the situation well when he said that 95 per cent of the cases of non-union which he had seen in the past three years were due to foreign material of some kind. He specified beef bone pegs. In like cases which I have seen, metal has been the greatest offender.

We should return to a serious study of the basic physiology of bone and the application of basic orthopedic principles of traction before advocating open reduction in a very high percentage of cases.

Moore, several years ago in the *Journal of Bone and Joint Surgery*, reported experiments on the splinting effect of periosteum on fractures. By almost any method of open reduction and internal fixation that we may apply, we disturb this splinting effect and the osteogenic powers of either the periosteum or endosteum, or both.

I frequently wonder if the x-ray has not resulted in more harm than good. There is a widespread tendency on the part of many of us to treat the x-ray rather than the fracture, and certainly too great a tendency to treat the fracture rather than to treat the patient.

I feel that with 50 per cent end-to-end engagement, in both views, with good alignment, most cases of fracture of the shaft of the long bones treated by proper conservative methods will result in strong bony union and good functional results. Fractures near a joint are quite a different matter and the above standard does not apply to them.

I have been so impressed with the large number of poor results in cases of internal fixation, applied by good average surgeons, that I think a note of warning should be sounded against it.

Dr. W. B. Carrell, Dallas, Tex.—I agree with Dr. Arnold in the principle of sound fixation in fracture treatment. This is obtained, in most cases, by suitable traction or good splinting. Not infrequently, however, internal fixation may be required, though the application of it should not be classified as a method of fracture treatment, but only a technical detail in carrying out the principle of good fixation.

In my limited experience with the intramedullary bone peg the results have been disappointing.

Fractures not properly reduced and cases of malunion opened for better position have been held most satisfactorily by removable internal fixation devices, combined with external splinting. A sufficient number of cases has now been tried to determine that union has been as rapid as in the average similar fracture reduced by the closed procedure. This is at variance with the usual delay caused by open operations, and in explanation the following factors are suggested:

The fragments are rigidly held with compression, causing surface necrosis and release of calcium early, in a most favorable position against the fractured ends.

Upon removal of the appliance at the eighteenth or twentieth day all effects of a foreign body are lost and there is probably a restimulation of callus formation at this time.

Dr. Frederick C. Kidner, Detroit, Mich.—Although Dr. Arnold's series of cases in which he has used intramedullary fixation of fractures apparently shows excellent results, I am convinced that as a rule an intramedullary peg is dangerous and harmful. Over a long series of cases the failures are more frequent than the successes. Intramedullary pegs must, of course, interfere with the nutrition of the bone and thus predispose to infection and prevent the formation of callus.

In our modern tendency toward operation, operative interference with fractures has become altogether too frequent. We have forgotten the experiences of the Great War. In that War, operative interference with

fractures for any purpose except for the drainage of infections was almost universally frowned upon. Thousands of the worst possible comminuted compound fractures were successfully cared for by simple methods of traction and splinting.

I remember one particular occasion in England, when I was Orthopedic Consultant to the British Area with the American Army. A certain American hospital received a train load of 500 freshly wounded American soldiers direct from Belgium. Among them were 90 compound fractures of the femur, all of which had been sustained within forty-eight hours. Twenty-four hours after the reception of this group of fractured femurs all of them had been properly reduced by the use of the Balkan frame, the Thomas splint and skin traction. Not one of them showed a shortening of more than a half inch.

In my own case, I feel that the employment of open operation upon any fracture is a confession of failure on my part. In 99 per cent of the cases, ingenuity and skill in the use of closed methods of reduction will obviate the necessity of open methods.

Dr. E. D. Martin, New Orleans, La.—Whenever I hear the term "hardware" used in the treatment of fractures as a cause of complications, I realize that it comes from men who have gained their information from the pioneers in this work, who, discouraged, did not have the stamina to continue in their efforts. My motto is: "If at first you don't succeed, fail, fail, until you do succeed." It was through my failures that I have succeeded. I noticed that whenever a screw held and the plate remained in position until ossification took place, there were no complications and no infection. The problem was then to make the plate hold.

I have not removed a plate in non-infected cases for fifteen years. I use the long wood screw, fixing the threads in the distal side of the bone, letting it protrude as much as one quarter of an inch at times. If properly inserted, that is, if it gets a firm bite, it holds and no difficulty is ever experienced.

Never treat the open reduction of fractures as a simple operation. There is none in my experience which requires better judgment and more perfect technic. I use the long screw in all bone work, whether in plating or fixing fragments. However, when you can obtain the same results by other means, never do an open reduction.

I have used long screws for twelve years in fractures of the neck of the femur and I challenge anyone to show better results. Another advantage in the use of long screws is the fact that the limb rarely requires the application of plaster, but is rested in a sling or Hodgin's splint, allowing the patient freedom of movement in bed.

Do not be too prone to criticise unless you have tested this method. I, too, would have felt just as you do had I read half of the stuff printed in our journals, usually by men who had no mechanical skill and no experience with the methods they condemned.

Dr. Arnold (closing).—Mature judgment and the result of long experience are necessary to determine without a trial which fractures will have to be opened for fixation and which can be reduced and maintained without open operation. The majority of the cases that I see are the result of failures after numerous attempts at non-operative reduction. I seldom resort to open operation for the reduction of fractures when I see them first.

I believe a Lane's plate has an important place, especially in compound infected fractures such as were met with during the War. We had several hundred cases of plates or metal fixation in gunshot fractures with considerable loss of substance, and all were infected. The important part which the plates played in these cases was to hold the limb or the part in proper relation to the normal until infection had cleared up and the time had arrived to do whatever was necessary to be done, such as bone grafting. As a rule, when the plate is removed, the cortex and dead bone are removed together and they leave a healthy granulating bone.

Non-union occurs in some cases regardless of what is done, yet in the majority of cases it is due to improper fixation. Fixation must be absolute and maintained over several weeks. The least amount of moving at the junction of the graft or fracture breaks up the normal cell formation and the result is fibrous union. After a few months this fibrous tissue becomes so dense that the blood supply will not go through. I have not found that beef bone pegs interfere with union of the bones if the peg is put in in the proper way, so as to allow the endosteum cells to migrate along the peg. Do not use a round peg and completely occlude the medullary canal. I have never yet had to remove a beef bone peg. I have had failures, as everyone else has who has had much to do with bone work. The only thing to fear in open bone operation is infection, and with proper technic this rarely occurs.

THE TREATMENT OF SERIOUS RAILWAY INJURIES*

By E. Dunbar Newell, M.D., F.A.C.S.,
Chattanooga, Tenn.

The severity of the present day automobile accident is so closely analogous to the severe railroad accident that the consideration of the one will include the other.

Ten years ago I operated by doing a subtemporal decompression upon practically all of my cases of fractured skull with severe brain trauma when not complicated by surgical shock. Today, we have almost abandoned subtemporal decompression as a means of relieving the brain tension of increased intracranial pressure. The patient, when first seen after a cranial injury, who is dazed and unsteady but who can give the information that there was a period following the accident when he did not know what occurred, has had brain concussion, brain trauma of a mild degree. This patient should be put

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to bed for several days and kept under observation.

The patient who is still unconscious when first seen, who is not in surgical shock, whose pulse rate is slightly abnormal with good volume, and whose blood pressure is normal or slightly high, has a moderate increase of intracranial pressure. He should be examined most carefully for weakness, spasticity or paralysis of muscles in an endeavor to localize the brain trauma or hemorrhage. Extradural hemorrhage does not occur so often as was formerly supposed. Trauma to brain tissue will cause localization of symptoms without a real hemorrhage. The ear, nose and mouth should be carefully inspected for blood and cerebrospinal fluid, especially in the absence of direct trauma to face and ears. Ecchymosis around the eyes, without trauma to the face, is almost positive evidence of skull fracture. Hemorrhage from the ear must be considered as due to a basal fracture until we can prove otherwise. The pupils in intracranial pressure of moderate degree may react to light, may be the same size and the fundus is usually about normal. The x-ray picture may show a fracture and usually does, but, if it does not, this should not in the least influence your prognosis or treatment; for after all, the fracture merely indicates the severity of the trauma which the brain has sustained.

When this patient, with a moderate degree of intracranial pressure, arouses from his unconsciousness, seems alert and talkative, is not restless, his pulse rate is just slightly up, and he improves gradually from day to day, sedatives, purgatives, lessened fluid intake and a strict recumbent position will be all the treatment necessary. However, if he does not improve and unconsciousness becomes more profound, or if he awakens from the unconscious state to become wildly delirious and uncontrollable, or if he is in a stuporous state and can be aroused only by vigorus shaking, then he has passed into the most serious state of marked intracranial pressure. By recording accurately and fully the symptoms when the patient was first seen, and by making repeated observations and comparing with the first examination, this state of marked intracranial pressure, in many cases, can be prevented by prompt and vigorous treatment. The spinal puncture should always be made when there is an indication, from the mental state of the patient, the slow pulse rate, the accelerated respiration, and the choked discs, that there is an increase of intracranial pressure. The pressure should be determined by a spinal manometer. No other method is accurate. When the pressure is above 10 mm. of mercury, it is abnormal and enough spinal fluid should be let out gradually to lower the pressure to 12 to 15 mm. of mercury. I have drawn off 50 c. c. of fluid at one time in order to reduce the pressure to 15 mm. of mercury, without any bad effects. Personally, I think the danger of a spinal tap in these cases has been greatly overemphasized. Just as soon as it has been determined from general symptoms, or from spinal tap, that there is an increase of intracranial pressure, then we give intravenously 100 c. c. of 50 per cent glucose and repeat every eight to twenty-four hours, as indicated from the symptoms. We give magnesium sulphate by mouth or bowel to cause free water evacuation. For restlessness, we give paraldehyde, chloral hydrate, bromides, luminal and sodium amytal, and morphine when other sedatives do not give relief. If in spite of repeated daily spinal punctures, in spite of glucose and magnesium sulphate, the intracranial pressure remains high and the patient is growing worse, then, and only then, do we resort to our practice of ten years ago and do a subtemporal decompression. Sometimes it saves lives when all other methods fail.

In depressed fractures we operate at once if the patient is not in profound surgical shock, and we operate under local anesthesia. In fact, we do practically all of our subtemporal decompression operations under local anesthesia. Where there is a distinct localization of a brain hemorrhage, we operate at once to stop bleeding and to remove the clot.

If the patient is in surgical shock, morphine is given, the patient kept very quiet, not disturbed even for an x-ray, external heat is applied and 300 c. c. of 25 per cent glucose are given intravenously at once. Patients who have received a severe cranial blow and who are suffering from surgical shock associated with medullary collapse should be moved or transported with the greatest care and gentleness, as the slightest movement of the head may greatly exaggerate the shock. The patient who is seen for the first time in deep coma with a fracture of the base of the skull, pupils dilated and fixed, general paralysis, pulse fast and weak, blood pressure low and respiration fast, skin cold and clammy, and temperature subnormal, is the patient who will always die within from

a few hours to twenty-four. We give these patients 300 c. c. of 25 per cent glucose every eight hours, but without hope of benefit.

We feel that we have greatly reduced our mortality by treating increased intracranial pressure by spinal taps, intravenous glucose, giving magnesium sulphate and operating under local anesthesia instead of ether anesthesia, and by doing fewer subtemporal decompressions.

The patient who is seen for the first time with mangled limbs and compound, comminuted fractures should be given large doses of morphine at once and the limb should be immobilized with traction to prevent the tearing of the soft parts by the broken ends of bone, thus increasing enormously the shock. Often, too, this immobilization and traction will almost immediately stop the profuse bleeding from a compounded fracture and will make unnecessary the application of a tourniquet. There is no simpler method than to apply the Thomas splint to the leg or arm and to make traction from the shoe or from the hand. Every railroad surgeon should have a supply of Thomas splints on hand.

When the patient is brought to your office or hospital and he is in shock, he should at once be made warm and comfortable and 300 c. c. of 25 per cent glucose should be given intravenously at once. If he does not come out of the shock quickly, preparation should be made at once to give 1,000 c. c. of blood, as there is no known method today that so effectively combats shock as blood, whether whole or citrated. The usually hurriedly administered drugs, such as strychnine, caffein, sodium benzoate, camphor in oil, suprarenalin and ephedrine, to overcome surgical shock are practically worthless and I do not think the modern physician can satisfy his conscience by administering these and feel that he has done all that is necessary.

The modern surgeon should be thoroughly familiar with giving intravenous glucose unless his patient can be conveniently transported to a hospital. After the glucose, or glucose and blood transfusions have been given, then we should begin very gently to cleanse the traumatized parts. Often, this can be done under local or regional anesthesia. Sterile liquid soap, sterile water and a ball of sterile cotton, held in a pair of forceps, are the best of all methods to cleanse the wounds. The cleansing should be done over and over, as it is not painful and does not increase the shock. During this process all dead tissue and devitalized tags should be removed and all foreign matter carefully wiped out or washed from the muscle and fascial plains. After cleansing with soap and water has been completed, then the wounds can be flushed with ether if it does not cause much pain. Unless the patient is asleep, iodine should not be used on large wounds. I have no objection to the use of iodine after the wound has been cleansed with liquid soap and water and flushed with ether, provided the patient is sleeping. Mercurochrome in such cases is worthless. If the patient is still in shock after the cleansing process is over, cover the wounds with sterile gauze, immobilize the fracture in a Thomas splint with simple adhesive traction and delay further operation until the patient has overcome the state of surgical shock; of course, always realizing that the sooner a wound is closed the less danger there is of infection, and the sooner the broken ends of the bones are apposed after the fracture the easier the apposition and the less trauma is done to the soft parts.

Immediately following a fracture or dislocation the muscle and tendons and ligaments are flaccid, but after a few hours, if the patient is not in profound shock, the muscles contract, and the muscles, tendons and torn ligaments become edematous and the reduction of the fracture, or the reduction of the dislocation, becomes far more difficult. About ten years ago, in a paper before the Southern Surgical Association, I made the statement that I treated all fractures as emergency cases, just as much emergencies as acute appendicitis. Within the past thirty days I reduced a backward dislocation of both bones at the elbow of three days' duration. The physician who first saw the case was waiting for the swelling to subside before attempting a reduction, although he had taken excellent x-ray pictures that showed the dislocation perfectly. He is a well educated, perfectly reputable, conscientious young man. We are not properly disseminating medical knowledge.

Where compound and compound comminuted fractures have been prepared as outlined, and the ends of the bone which have been grossly exposed have been cleansed with ether and the dirty points snipped off, I have little dread of infection or osteomyelitis, provided the blood supply is adequate. Osteogenesis is more rapid and more certain than in simple transverse or oblique fractures. Do not amputate a limb if the blood supply is adequate unless there has

been such great destruction of soft parts that the sound limb would be less useful than an artificial one. Especially is this true of the hands and fingers. A badly mangled hand, under local anesthesia, you can spend hours repairing, but you will be thrilled after a few months to see a very useful hand that seemed utterly hopeless when the operation began.

DISCUSSION (*Abstract*)

Dr. H. M. Michel, Augusta, Ga.—As soon as a fracture occurs it ought to be reduced, but practically speaking, we can wait a long time to reduce it, one day, two days, three days, if the patient is not in a condition for its treatment. This is true in injuries to the skull. A fractured skull is to be looked after from the point of view of the injury to the brain, not to the bony structure.

Let us relieve the patient, by heat, by glucose, and so on, before we do much for the local injury.

Dr. W. F. Smith, Little Rock, Ark.—The treatment of shock attendant upon severe fractures is important and the method outlined in this paper cannot be improved upon. The early sterilization, with slight traction, followed by intravenous glucose is excellent. Morphine is also indicated. Blood transfusion may be given later if necessary. Stimulants, such as strychnia and camphor in oil, have no place in combating shock. Great shock follows many of these fractures, especially of the thigh. In a series of blood examinations of simple fracture of the femur, we found an increased leucocytosis in the first twenty-four hours, the count being as high as 12,000 to 15,000 in some cases.

Dr. Frank K. Boland, Atlanta, Ga.—Dr. Newell referred to the change which had come over his treatment of fractures of the skull. I rise to pay tribute to a dear friend of mine who passed away in Atlanta recently, Dr. Charles Edward Dowman. I wish to praise him especially for teaching our section of the country the better treatment of these fractures.

Before his coming to Atlanta fifteen years ago, it was our custom to do subtemporal decompressions in many of these cases, and the mortality was very high. After Dr. Dowman came to Atlanta, however, he demonstrated to us the proper treatment of acute injuries of the brain, the conservative treatment by the administration of glucose and magnesium sulphate solutions. He taught us that if operation was indicated, it should be done under local anesthesia.

Dr. W. W. Harper, Selma, Ala.—Last summer I visited the Clinic of Dr. Frank Lahey in Boston. I mentioned to him that we frequently got a reaction after the administration of glucose even when we used the buffer substance. He said, "We had the same experience until we found the cause, which was acid forming in the tubing of the intravenous outfit. We then adopted the technic of running soda solution through the tubing as soon as the glucose solution had been administered. The tubing and container remain in soda solution for two hours, after which they are sterilized. Since adopting this technic we have had no further reactions from the administration of glucose."

I recently heard a paper on "Head Injuries," by Dr. C. H. Hopkins, of Chicago. He stressed these three points in diagnosing intracranial lesions, it matters not what part of the skull is injured. (1) The intracranial lesion is on the same side on which the pupil is dilated. (2) It is on the opposite side of the higher axillary temperature. (3) It is on the same side where the blood pressure is highest. These signs are very valuable in cases in which the site of the injury is uncertain.

Dr. Frank P. Strickler, Louisville, Ky.—The diagnostic significance of a unilateral, dilated and fixed pupil has been known for a period of fifteen or twenty years and is always considered a symptom of hemorrhage on that side, indicative of an immediate operation.

The human body will oxidize a certain amount of glucose in a given period of time, namely: for every three pounds of body weight the human being will oxidize one gram of glucose each hour. If you give the body more glucose than it can oxidize, you immediately get a rise in temperature. The temperature will go up as high as 104°, 105°, and 106°. I have seen it go as high as that. As soon as we cut down the rate and amount of glucose that we are giving the temperature will come down.

I have one case which I kept on continuous glucose, 10 per cent, for a period of three weeks, using the veins in both arms and legs. I gave the patient 14½ pounds of glucose. If you are going to give glucose, be liberal with it. Do not give 100 c. c. of 5 per cent solution and stop. That is just teasing your patient and he will, as a rule, oxidize that amount before you get out of the hospital.

In a series of fifty thousand cases of skull fractures collected from the hospitals in the City of New York, about 5 per cent were operative cases. It is very seldom necessary to operate upon a fractured skull. By the use of glucose solution given in massive doses, if you prefer, or by continuous intravenous dehydration with 10 per cent glucose, or the administration of magnesium sulphate, 25 to 50 per cent by mouth or rectum, and the restrictions of fluid intake you can control intracranial pressure. If you cannot control intracranial pressure, do a lumbar puncture and drain off the spinal fluid until you have relieved one-half the pressure.

I want to call attention to the work of Dr. Temple Fay, of Philadelphia, who warns against the use of intravenous saline solution. It may be dialyzed, taken into the cells, become locked there and may actually increase the intracranial pressure instead of lowering it. Neither do I care for the intravenous administration of magnesium sulphate solutions.

Dr. Rene Lerich of Paris has recently called attention to the fact that we may get a pressure entirely too low which may also cause serious damage. In those cases, of course, fluids have to be forced.

In the treatment of fractured skulls, I unreservedly endorse the conservative treatment.

There is now on the market a combined tetanus gas gangrene antitoxin which should be used, in my opinion, in all cases.

Dr. Hunter Sweaney, Durham, N. C.—We give intravenous glucose in 5 per cent solution, not in just one large dose, but continuously. We use a special apparatus to avoid having bacteria in the distilled water.

Dr. J. H. Hendren, Pineville, Ky.—It is not necessary to use distilled water in intravenous solutions at all. I have not used it in my office for five years. If I am out in the country I do use it. In my office I

boil the tap water for five or ten minutes, filter it through sterile cotton into a sterile flask and use it while it is warm.

The reaction from intravenous solutions is due, in my opinion, to the fungi and the moulds that get into the distilled water after it has been distilled. You can use the best of distilled water one day without a reaction, and again in three or four days get all kinds of shock from it. But if you will boil the same distilled water or any other water, and filter it through two or three layers of good cotton, you will have no shock from using it.

Dr. Newell (closing).—We have not had any trouble in giving glucose intravenously. We always use freshly distilled water, and, when the transfusion is over, the nurse at once runs hot sterile water through the tube. The entire apparatus is resterilized and then put away in a sterile towel until it is used again. The surgical nurse handles this apparatus.

In combating surgical shock we get the best effects from a 25 to 50 per cent solution of glucose, using from 300 to 500 c. c. at a time. We have not found a 5 per cent solution of glucose effective in combating surgical shock. When we wish to give from 3,000 to 5,000 c. c. of fluid a day, we use the 5 per cent solution and give it continuously in the vein, allowing it to run into the vein at the rate of 150 to 200 c. c. per hour. An expensive apparatus is not necessary. The most effective method is to apply a clamp to the rubber. The nurse can regulate this clamp accurately and have the rate of flow under vision at all times, as the glass container (Kelley bottle) is graduated in cubic centimeters.

We have never given gas gangrene serum or antitoxin, as our cases of gas gangrene have been infrequent. We think that is needless serum medication. We have not had a case of gas gangrene in fifteen years in our series of traumatic injuries. However, we always give antitetanic serum whenever there has been any contamination with the soil or where there has been a penetrating wound.

PRACTICAL POINTS IN REFRACTION OF THE EYE*

FROM A STUDY OF EIGHTEEN THOUSAND PATIENTS

By DUNBAR ROY, M.D.,
Atlanta, Ga.

I have been led to write this paper because of long experience in refraction work and because, after all is said and done, it is experience in the long run which enables any physician or surgeon to correct his errors of deduction.

Refraction of the eye is not a mathematical science, although the numerous text-books on this subject would lead one into this error.

The nodal point, the focal point, the refraction of the rays of light passing through different densities of transparent media, together with other mathematical data connected with the work of the physicist, are more or less definite in their evaluation, but applied to the eye they are only relative in their significance. The writer now has the records of eighteen thousand private patients who have been refracted, an insignificant number as compared with that of many other ophthalmologists.

I say refracted, because a small number of these were not given glasses after the refraction had been made.

I shall not enter the technical discussion of refraction, but shall try to confine myself to those problems which can be understood and appreciated by even the physician and surgeon.

I wish again to emphasize the statement that the eye is not a mathematical entity. To obtain the best results in the prescribing of glasses one must consider the personal equation. Let me give only one illustration. It would be foolish to prescribe presbyopic glasses for work at thirteen inches when the individual wishes to perform his or her work at twenty-four inches.

This is the reason why one sometimes hears the statement made that a patient obtained a pair of comfortable glasses at the five and ten cent store after he or she had been unable to wear the glasses obtained from a regular oculist. The patient simply picked out a pair of glasses, tried them for the distance at which he desired to work and thus succeeded in obtaining glasses adapted to his needs.

This, of course, applies to those individuals who have no peculiar astigmatic error.

MYDRIATICS

The views of the writer on the use of mydriatics, or pupil dilating drops, I know are at variance with those of the great majority of ophthalmologists of the present day, but they have been forced upon me after thirty-five years of this work.

I rarely use a mydriatic after the age of twenty. In young children it is frequently advisable. My objections to its use are the following:

(1) It puts the eye into an abnormal condition.

(2) When used, the oculist in the great majority of cases prescribes the glasses before the accommodative effort has been restored. Espe-

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cially is this true of out-of-town patients who come in only for the day.

(3) For the above reason the glasses prescribed are usually too strong.

(4) Refined and experienced retinoscopy allows an estimation of the error without paralyzing the accommodation.

(5) The mydriatic destroys the relationship of balance which exists between the extrinsic muscles and the muscle of accommodation.

(6) It is more necessary to use a mydriatic in cases of myopia than hypermetropia. Most ophthalmologists consider the reverse true.

METHODS OF TESTING

The final arbiter in guiding us to the correct prescription for glasses must admittedly be the test card and trial lenses. The writer has long ago discarded the ophthalmometer. It shows corneal irregularities, but is too uncertain in the estimation of real astigmatism.

Astigmatic charts have also been relegated to things antique. Many an hour has been wasted in trying to make all the fan-like lines appear with the same distinctness.

Retinoscopy is the next surest test. Its great value lies in the fact that it is an objective test, thus not dependent upon the answers of the patient.

Long experience gives valuable information for the estimation of myopia and hyperopia by the use of the ophthalmoscope. Other mechanical tests are purely adjuvants and for the most part useless, but they help to impress the patient with the variety of the office trappings.

The Indications for Glasses.—Many eyes have been fitted to glasses unnecessarily. The aim of the ophthalmologist should be rather to keep glasses off of a patient than to put them on. There never was a more erroneous idea held by the laity and even by many physicians than the dictum that glasses should be changed every three years. On the other hand, the longer one can wear the same pair of glasses the better it is for the eye and the more of an indication that the error is remaining stationary. It is my idea that this false propaganda is largely due to the opticians, who are always anxious to change every pair of glasses.

During the last few years a great deal has been heard about certain eye exercises which enable one to discard the use of glasses. This has been largely due to the teaching of Dr. W. H. Bates, of New York.

There is a certain amount of truth in these ideas. The reason they have obtained any following whatever is because of the errors of ophthalmologists. Their error has been the prescribing of glasses for patients when they did not need them. Too many of our profession are still imbued with the commercial instinct. They reason that if a patient comes to have his eyes examined he will not be satisfied if glasses are not prescribed and will be unwilling to pay a consultation fee, just as many rhino-laryngologists reason that if they do not remove the tonsils of every patient some other specialist will, and thus they will be robbed of some remuneration.

Europeans call us a nation of eyeglass wearers. Slight errors of refraction, especially in children, do not need correction. A little prophylactic exercise and advice in the use of the eyes will rob many a patient of glasses. Young people have strong eye muscles which were given to them for use. Why handicap this development by correcting very small errors of refraction? How many constitutions have been made strong by a proper physical exercise? Suitable exercise for the eyes will accomplish the same results.

The writer does not mean that glasses should never be given to a child, but rather that more honest judgment should be used in prescribing glasses in those cases of small errors. Glasses are like splints in fractures: the longer you use them the longer it takes to recover the strength of the muscles.

Myopia.—Myopia or near-sightedness is one error for which many opticians and even ophthalmologists sometimes err in prescribing glasses.

This condition means a diseased eye and as such should be treated like a gastritis, ulcer of the stomach, cardiac lesions, arteriosclerosis or other chronic bodily ailment.

Almost without exception the myopia increases from year to year in spite of all our efforts to stop the process. In the writer's experience a most pernicious error is the yearly changing of glasses to increased strength in this condition until the lenses themselves become a burden by their physical weight. This statement is especially true in the case of young children and adults.

It has long been a divergent view among ocu-

lists as to whether or not a full correction should be given to these patients. The writer feels convinced that a partial correction is better than a full correction.

The histories of my cases have convinced me that the myopia has increased more slowly under this regime than under the other.

Time does not permit me to fortify this statement by argument or narration of cases. I am giving results from thirty-five years of experience.

However, as a corollary to the above statement, I should like to emphasize the fact that myopic patients should undergo a two weeks' atropine and hot water fomentation treatment at least once a year.

Inequality of Vision.—Where errors of refraction exist in the eyes of an individual, a certain per cent of cases show a difference of the vision in each eye, and frequently a different degree of refractive error.

In the writer's observations the prescribing of glasses for these patients has led many an oculist into error and caused many a dissatisfied patient. Usually if such errors exist they have been present all the patient's life. The centers in the brain which coordinate the working of the two eyes have become adjusted to this irregularity in the two eyes. How foolish to try and make the vision in the two eyes identical, with decidedly unequal lenses! We create an imbalance in the brain centers, and usually the patient is unable to obtain the desired relief. If we correct the two eyes but leave the same visual difference, the patient may not see quite so well with the more affected eye, but he will have more comfort in wearing his glasses and can do better work.

The same thing applies to eyes where the vision in one eye is hardly any more than the perception of light.

Many oculists prescribe a plain glass for this defective eye. If the same glass is given for this eye as is prescribed for the good eye, one will frequently find a decided relief from the complaints of patients. I have had a number of cases which substantiate this procedure.

Muscular Imbalance.—I am convinced of the importance of thoroughly testing the extrinsic muscles of the eye when the refraction is made. If prisms are needed, then have them incorporated with the grinding of the lenses. Decentering the lenses for prismatic effect is too uncertain and very few opticians have the ability to produce the results required.

Practical Office Tests.—I mean by this that I make the patient read with and wear in a trial frame the glasses which have been decided upon for at least half an hour. If necessary, this should be repeated several times before the prescription is given. The patient can wear the glasses in one's reception room. The reason for this is the fact that the ophthalmologist frequently finds a patient with peculiar astigmatism or an unduly strong muscle of accommodation or other idiosyncrasies who does not accept the glass which our test methods have chosen. Then again, twenty feet is not infinity. Consequently the patient may accept a glass for this distance in your office, but find it unsuitable when out in the open. To the majority of patients the present prices of glasses are too expensive to make changes at short intervals. Practical testing of reading glasses in one's office for peculiar, dissatisfied individuals will save the ophthalmologist many return engagements from these individuals and lessen the irritation to him attendant upon their visits.

Eyeglass Frame.—Finally, a few words in reference to the frames to be used. This is almost equal in importance to the prescribing of the proper lenses in so far as comfort to the patient is concerned.

Few opticians have the mechanical technic necessary for the proper fitting of frames. Frames, like ladies' wearing apparel, run in cycles of fashion. Six or eight years ago few people, especially young women, would accept anything but large horn rim glasses. Such frames are suitable only for people with large facial measurements. To see *petite*, small faced people wearing this style of frame was positively ridiculous. Even now you see them, although the width of the frame extends beyond the width of the face. Such frames can never be properly centered for pupillary measurements.

White Gold Frames.—Then again the majority of such frames have the double curve behind the ear. These can with great difficulty be kept tight enough to prevent the frame from slipping down on the nose. What more grotesque appearance! Every oddly shaped spectacle frame is now on the market purely for the purpose of changing the style. The idea that very large lenses are necessary for the eyes is another familiar error. What looks worse than such large lenses on a face with extremely

small features? In such cases it is impossible properly to center the lens for the pupils.

Newly advertised scientific lenses are being constantly brought to the attention of all wearers of glasses. Most of them produce no better results than the toric lenses which have been used for years. However, the increased price is considerable. Why inflict increased prices on the dear public when the increased prices of living have already burdened the man of moderate means? In closing, the writer wishes to emphasize one duty which the ophthalmologist owes to the patient for whom he has prescribed glasses. This duty is to have the patient return in a few days so that the lenses may be properly checked and the frames examined thoroughly to see that they are properly adjusted and fitted to the face.

DISCUSSION (*Abstract*)

Dr. E. H. Cary, Dallas, Tex.—My experience has been dissimilar from Dr. Roy's in many instances. In all probability my own attitude has been largely influenced by having been a very great sufferer from disturbed reflexes. I was 27 years old before one of my confreres in the Eye and Ear Infirmary relieved the small astigmatic error of refraction which had been the source of a most unhappy condition throughout my school life. This would suggest that individuals cannot all be handled in the same way. They differ materially, both in their refractive status and in their nervous response to these errors.

A manifest refraction should always be made; following this, a complete relaxation of the patient's ciliary muscles, if there is no contraindication. The oculist should have before him the retinoscopic findings, and with these and his manifest refraction, and the history, his judgment is then brought into play.

For a number of years I have been convinced that the care of myopia is an individual question, too, and that the best method of controlling the mildly progressive myopia in young people is to find and correct fully their refractive error. I agree with Dr. Roy that glasses should not be advised for all refractive errors. It is a problem which should be decided with complete knowledge of the individual.

Properly fitted glasses do not need to be changed as frequently as patients are led to believe. Of course this depends entirely upon the refractive status, and very much upon the compromise made in the strength of glasses prescribed, which has been modified by ciliary muscle activity and the age of the patient. It is my experience that patients with few exceptions (and there are some exceptions) are best refracted when their eyes are in balance, that is, when refraction is equalized.

I am not quite certain about the brain centers becoming adjusted to different degrees of refraction of the two eyes and becoming distressed when each eye is brought up to the correct level with the other. It has always seemed to me that to harmonize these two images was the most important thing.

I agree with the author that muscular imbalance should be known in every case. Its cause should be remedied if possible. This remedy can be one of many things: a sinus operation; if very pronounced, a muscle operation; proper refraction; exercise and tonics; finally, a small prism is often worn with great comfort.

Dr. W. Thornwall Davis, Washington, D. C.—I was interested in Dr. Roy's statement that patients might obtain more satisfactory glasses from the store than from the ophthalmo'ogist. Not infrequently one may make that observation. The ophthalmologist may be too theoretical; he may depend on his retinoscopy too implicitly. The court of last resort is the trial frame; upon its findings should the prescription be based. There are many attempted short cuts in refraction, but those of riper experience agree that it can only be done with patience and understanding, and that every case is a law unto itself.

Ascertaining the refraction may be termed the science of refraction. This begins with the history, external and ophthalmoscopic examination, and ends with retinoscopy. Then begins the art of refraction, the examination at the trial case. Patience and understanding of the patient's individual needs should guide us here. The patient shou'd be given the prescription that he requires to make him comfortable, and this may not correspond with that which was determined scientifically. The scientific basis is necessary for intelligent and proper work, and the patient's prescription for glasses should be based upon this. It is most important to prescribe a glass with which the patient sees well and works comfortably.

I am in thorough accord with Dr. Roy that many patients are wearing glasses who do not require them. The reaction to this is seen in the passion for exercises that has taken a hold on the laity. Our friend, Dr. Bates, of New York, cures them all with exercises. One must be in accord with Dr. Roy in his statements about prescribing glasses unnecessarily.

There is no question that the wearing of glasses by hypermetropes weakens the accommodation and causes the patient to become dependent upon them. Too frequently the ophthalmologist will give glasses to correct the full hypermetropic error, as shown by the retinoscope under a cycloplegic.

It must then dawn on us after due consideration that the art of refraction is a difficult one. In order to do this work well, careful consideration of the patient's hereditary factors, social background, and business or profession is necessary. Likewise the condition of his nervous system and his physical state. Every factor must be given careful attention. In addition to this, experience teaches us that asthenopia may be due to many causes other than eye strain; the "non-refractive asthenopes" whose symptoms may be due to fatigue, overwork, migraine, sexual disturbances, and a host of other bodily ills. It is unfortunate to prescribe glasses unnecessarily for a young girl with headache resulting from sedentary life and overwork at school.

In this connection may I invite attention to the usual method of prescribing the full correction in those with convergent squint. This helps the squint in many cases and is the proper thing to do. One should bear in mind, however, that if the child wears this full correction too long the accommodation will become so habituated that he will be unable to dispense with

the glasses. He will require them for both distance and near vision for the remainder of his life. These cases should have intensive training with occlusion or atropinization of the fixing eye and stereoscopic exercises. If within a reasonable period cure is not obtained, operation should be advised. All this can be accomplished within one or two years and the child cured of the squint and relieved of the glasses before the school age of six years. Please permit me to emphasize this last, relieved of the glasses. Do we quite realize what a handicap glasses are to the young child, the active growing boy or girl, the young man and young woman at college? Should we not make every effort to relieve them of this handicap? Do we realize that if we keep strong glasses on a young child too long for the correction of his squint, he will never be able to do without them? Do we consider a convergent squint cured if the patient has to wear glasses all his life in order to keep the eyes straight? Personally, I do not consider an individual with squint cured who has to wear glasses to correct it.

The patient with retinal arteriosclerosis frequently has very obstinate asthenopia. He may be unable to distinguish the difference of a half to one diopter. There is alternate blurring and clearing of the letters not unlike that seen in neurotic individuals. However, in those with retinal arteriosclerosis the reaction is characteristic. Its presence may cause one strongly to suspect the presence of sclerosis of the retinal vessels, which will be verified upon ophthalmoscopic examination. I have called this the "arteriosclerotic" reaction. One occasionally finds such cases very difficult to handle.

I am heartily in accord with what Dr. Roy says of frames and proper adjustments. All the careful work of the ophthalmologist may go for naught if the optician is faulty in fitting the glasses. Every case should return within ten days or a fortnight for checking of the lenses, of the fitting, and of the comfort.

The manufacturing opticians are pushing new lenses, new tints, new frames, all of which is good business on their part and is mostly done in good faith. It is our important duty, however, to protect our patients from unnecessary expenditure. Investigate yourself and ascertain if the lens for which great results are claimed has real value. If you are at a loss as how to do this, write the Bureau of Standards at Washington and they will give you a scientific report upon tints, kinds of glasses, and forms of lenses.

Dr. H. B. Searcy, Tuscaloosa, Ala.—Although I know that mydriatics must be used frequently, I do not think it necessary to use them so much as is commonly done.

I would like to mention one thing that I have never seen in the literature and that is refraction under ether. Occasionally a child comes in that I cannot control and I have refracted him under ether. It is not very satisfactory, but much better than I can do in any other way. One drop of homatropin prior to the ether will dilate the pupils sufficiently for use of the ophthalmoscope and retinoscope. It may be necessary to use slight traction to pull the eyes down and get slight distortion of the cornea. The room must be sufficiently light to permit the anesthetist to work and also dark enough for retinoscopy.

Dr. E. W. Carpenter, Greenville, S. C.—It is important to remember that human beings use the center of the cornea to see through and not the periphery. In refracting one must have a perfectly dark room, with an intense central point of light, using a small plane or concave mirror, and the glass itself must be perforated in order to eliminate reflexes. You will be surprised to find how few ophthalmologists have familiarized themselves with the art of manifest refraction. While the fundamentals of refraction are based on scientific physical principals, the results and successes are largely based on an art acquired through a knowledge of the science.

Dr. Arthur Whitmire, New Orleans, La.—Dr. Feingold always used a cycloplegic in refraction. I think it is a good method to use a cycloplegic where it is not contraindicated. This is best done by placing the patient in a reclining position and having him look slowly along the ceiling and walls in order that you may obtain a panoramic view of the fundus. There are many things to be seen, such as: hyalin streaks, vascular changes, pigmentation and other conditions which you should study. If we cannot obtain normal vision with glasses, often we can interest an internist in the patient. I do not think we should omit drops where they are not contraindicated, for in doing so the ophthalmologist gives to the optician the much coveted whip handle.

Dr. Oscar Wilkinson, Washington, D. C.—I believe in the use of cycloplegics in those cases in which the history reveals frequent changes of glasses and asthenopic symptoms. Those cases certainly ought to have a thorough examination, and I agree with the last speaker that we cannot get that without a cycloplegic. I have never been as adept as my friend Carpenter in doing retinoscopy without a cycloplegic.

I agree that too many patients wear glasses. I have a great many patients referred by general practitioners for slight headaches, and they are always disappointed when I do not give them glasses, but with the correction of a very slight conjunctival congestion many of them do not need glasses.

As to the myopes, I fully agree with what Dr. Roy says with reference to using atropin, except that I believe it should be given twice a year instead of once. And I further believe that we should consider progressive myopia as a disease: a diseased eye, in a diseased patient, and that these patients should be inhibited from doing close work. They invariably, when they are children, read unnecessary books at night, and when they grow up they pick out some difficult profession, and both should be interdicted from the beginning.

Dr. W. G. Harrison, Birmingham, Ala.—As a freshman in college I had much headache and pain in my eyes and other discomfort. I was thoroughly examined by the most prominent oculist in the South, who did not use drops in my eyes. He prescribed glasses for me, which did not relieve me. I had to have some one read to me in order to remain in college and

eventually, after many examinations, the oculist told me I would have to leave school.

I was subsequently examined by Dr. Savage, of Nashville, who put drops in my eyes. He prescribed glasses for me with which I could read as much as I pleased. I decided then that I would be an eye doctor and would use drops in all young eyes needing lenses.

Dr. Ray K. Daily, Houston, Tex.—When men of such wide experience as Dr. Roy make the statement that we are putting glasses on people unnecessarily, it should not go by without challenge unless we are willing to admit that it is true. There is no doubt that many hyperopes who wear glasses can see without them. But what is the price of such vision? It is an over-exercise of the accommodation. It is a waste of nervous energy which may result in any one of a multitude of symptoms due to fatigue, as headache, inability to concentrate, restlessness, and general irritability. Why not put the ciliary muscle into a normal condition by relieving it of unnecessary work? It takes a very careful and intelligent historian to determine whether a child or a young adult needs glasses and to trace symptoms to eyestrain. If you prescribe glasses only for those who have exhausted the activity of the ciliary muscle and have come because they can no longer see, you are in my opinion neglecting your patient, doing him harm, and depriving him of years of normal enjoyment of living. In this age of tense mental and physical activity, beginning early in life, we should conserve every particle of nervous energy and not burden a patient who needs glasses by an over-exercise of accommodations. I also cannot agree with Dr. Roy about the discarding of the ophthalmometer. I find it most valuable in finding the astigmatism of patients following cataract extraction. It is my routine to check my patients' glasses before they are permitted to wear them.

Dr. Roy (closing).—I wrote this paper more to hear discussion of whether full strength or partial strength glasses should be used in myopia than for any other reason. All the best men, Jackson, for example, have said there should be a full correction, but I have obtained better results by not giving full correction to some patients.

With the same amount of error and the same degree of lens you will make mistakes time after time, because individuals differ considerably. Dr. Harrison, for example, may have had a partial correction, yet a number of persons with the same amount of error would not need the same glasses. Some people do not have severe symptoms. They have no headaches, no discomfort, and they should be treated differently from those who have neurotic symptoms.

I did not mean that I do not use atropin or homatropin; I mean that in a large majority of cases in patients above twenty I can get good results without its use. If I find a case that is puzzling I always use homatropin, especially in children. I do not think a child should be refracted without using homatropin, but in later years it can be done without trouble.

SYPHILIS IN THE RURAL NEGRO

RESULTS OF A STUDY IN ALABAMA*

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At the meeting of this Association last year there was presented a paper on syphilis[1] which described a series of demonstrations being conducted in certain Southern states under the auspices of the various state boards of health, the Julius Rosenwald Fund and the United States Public Health Service. One of these demonstrations was carried out in Macon County, Alabama, and forms the basis for this study.

The original plan had as its objectives:

(1) To determine the incidence of syphilis amongst an unselected group of rural negroes of all ages.

(2) To determine the feasibility of providing field treatment for infected cases.

(3) To investigate the effects of syphilis on the negro and to study the results of treatment.

This paper is concerned chiefly with the first two objectives. The end results of treatment can not be known until later.

Macon County is essentially a rural county with a large negro population, the 1930 Census figures showing a total population of 27,103, of whom 22,320 were colored. It was chosen because of its rural nature, because of a well organized county health department, and because Tuskegee Institute, located in the County, had offered its cooperation. Approximately one-fourth of the County, situated from fifteen to twenty-five miles from any town, was selected and the study was begun in March, 1930.

The personnel consisted of a negro physician and a negro nurse working under the direct supervision of the County Health Officer.

Survey.—First, blood tests were made on the entire group and all positive cases were rechecked before commencing treatment. All specimens were obtained by means of Keidel tubes and were examined in the central laboratories of the State Board of Health. The Kahn precipitation test was used throughout, although

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a Wassermann (Kolmer technic) was done on some of the doubtful reactors.

The following table shows the age and sex distribution of all patients examined:

It will be noted that of the total group examined 36 per cent showed a positive Kahn precipitation test, and also that the rate for males was 33 per cent as compared with 38 per cent for

Table 1

TABULATION OF KAHN TESTS—MACON COUNTY, ALABAMA

	Male				Female				Grand Total			
Age	Negative	Positive	Total	Per Cent Positive	Negative	Positive	Total	Per Cent Positive	Negative	Positive	Total	Per Cent Positive
0- 4	30	6	36	17	33	7	40	17	63	13	76	17
5- 9	171	65	236	28	133	68	201	34	304	133	437	30
10-14	204	64	268	24	203	88	291	30	407	152	559	27
15-19	169	66	235	28	170	99	269	36	339	165	504	33
20-24	101	57	158	36	119	85	204	42	220	142	362	39
25-29	55	34	89	38	90	69	159	43	145	103	248	42
30-34	34	29	63	46	89	47	136	35	123	76	199	38
35-39	50	31	81	38	77	70	147	48	127	101	228	44
40-44	36	20	56	36	60	62	122	51	96	82	178	46
45-49	80	55	135	41	73	38	111	34	153	93	246	38
50-54	63	55	118	47	55	40	95	42	118	95	213	45
55-59	33	18	51	35	23	16	39	41	56	34	90	38
60-64	36	14	50	28	34	25	59	42	70	39	109	36
65-69	16	15	31	48	28	9	37	24	44	24	68	35
70-74	16	8	24	33	11	6	17	35	27	14	41	34
75 and over	13	6	19	32	10	5	15	33	23	11	34	32
Age not stated	2	1	3	33	4	4	8	50	6	5	11	45
Total	1109	544	1653	33	1212	738	1950	38	2321	1282	3603	36

females. The highest percentage of positives was in the age group 25-44, but the high incidence amongst children is also noteworthy.

Treatment.—Treatment centers or clinics were established at six points in the area, one day being given to each center. Before commencing treatment each patient was given a physical examination, including urinalysis, and upon this the type of treatment was based. Some of those with positive tests did not report for treatment and some were refused the routine treatment on account of physical conditions. Additional members of families, in which there were positive cases, were located and brought to the clinics. *Table 2* shows the number of those actually treated.

Table 2

CLASSIFICATION OF CASES TREATED

Congenital			Acquired			Total
M.	F.	Total	M.	F.	Total	
124	193	317	375	511	886	1203

The complete course of treatment outlined consisted of twenty doses of neoarsphenamine and mercury inunctions for a period of thirty-two weeks. The mercury was given by the mercury belt method and each patient was given enough at each clinic visit for the next six days. It is impossible to tell just how much mercury was taken, but it was found necessary to cut down the daily dosage to one-third or one-sixth of a mercurette on account of the rather frequent occurrence of ptyalism. On account of age and certain physical conditions not all were given neoarsphenamine. *Tables 3* and *4* show the type of treatment administered.

Table 3

TREATMENT PRESCRIBED

Total No.	Neo and Mercury	Mercury and KI	KI
1203	1016	128	59

Table 4

TREATMENT RECEIVED

Neoarsphenamine

Total No., 1016; 20 doses, 619; less than 20, 397; per cent complete, 60.92; total doses, 16,103. Average per patient, 15.85.

Mercury

Total No., 1143; 32 weeks, 615; less than 32 weeks, 528; per cent complete, 53.8; total doses, 24,981. Average per patient, 21.85.

It will be noted that of those for whom arsenicals had been prescribed, 60.92 per cent took the complete course and that the average

patient received 15.85 doses of neoarsphenamine and mercury inunctions for 21.85 weeks.

Reactions and Deaths.—In the beginning the amount of mercury recommended was one-third to one-half a mercurette daily. This was soon found too large, because of the occurrence of ptyalism in a considerable number. Dermatitis also appeared in several patients, but was relieved by the temporary discontinuance of treatment and by sodium thiosulphate intravenously and by mouth.

During the period of observation and treatment, which lasted fifteen months, ten deaths occurred. None of these could be attributed, in any way, to the treatment received, with the possible exception of one male, age 24, who died of acute nephritis after receiving three doses of neoarsphenamine. Investigation showed that he had been under treatment for nephritis for several months prior to the beginning of treatment and that he had an acute exacerbation of symptoms and died two weeks after his third arsenical injection and after his third week of mercury. Most of the other deaths were amongst elderly people who were not receiving active treatment and were ascribed to "heart disease," "malignancy," "pneumonia," "tuberculosis," and "malaria."

Effect on Kahn Test.—Five hundred and seventy-five of those completing the full course of neoarsphenamine and mercury were re-tested at the end of the course. Of these 323, or 56 per cent, were negative. Three hundred others were re-tested after varying amounts of neoarsphenamine and mercury, and of these 165, or 55 per cent, were negative. Combining these two groups, there was a reversal of the Kahn test in 56 per cent of those given neoarsphenamine and mercury.

Primary Lesions.—Of the cases classed as "acquired," there were 375 males and 511 females: 185 of the 375 males, or 49.33 per cent, gave a history of primary lesion; 13 of the 511 females, or 2.54 per cent, gave a history of primary lesion.

From this it would appear that relatively few women have any knowledge of when they actually acquired their infection. Of the males with primary lesions 46, or 25 per cent, had acquired the disease within the year and 93, or 50 per cent, within five years. These figures would indicate that the propagation of this disease is going on at an increasingly rapid rate.

Treatment History.—Only 33 out of the 1,203 under observation had received any prior treatment. They had received neoarsphenamine from 1 to 17 doses with an average dosage of 4.2 per patient. This almost complete lack of treatment may account for the high infection rate amongst the group.

Miscarriages.—An effort was made, in each female, to determine from the history whether or not one or more miscarriages had occurred. One hundred and sixty-one of the 511 acquired cases gave a history of one or more miscarriages. The maximum number for any one case was eleven and the average per case was 1.9. Since many of these women with acquired syphilis had never been pregnant, the percentage of pregnancies ending in miscarriage is quite high.

Cost of Demonstration.—The total cash outlay for the demonstration was $12,800.00. This is an average cost of about $10.65 for each patient treated and a per capita cost of about $3.45 for each person examined. The Julius Rosenwald Fund contributed $7,665.00 and the State Board of Health contributed the balance. No estimate is included in the figures of the value of the supervision afforded by the United States Public Health Service nor of the services of the county health department.

The county health personnel gave a great deal of time to this program, but in return the clinic gave them the opportunity to immunize this group against typhoid fever, diphtheria and smallpox and also to carry out a well rounded health program in the entire area covered by the survey.

SUMMARY

(1) A survey of the prevalence of syphilis amongst rural negroes has been made in Macon County, Alabama.

(2) Of a total of 3,603 individuals of all ages tested, 1,282, or 36 per cent, were found to have positive Kahn tests.

(3) Twelve hundred and three were placed under treatment. Of these, 317 were classed as "congenital" and 886 were classed as "acquired."

(4) Of those put on neoarsphenamine, 60.92 per cent completed their course of treatment.

(5) The average patient under treatment received 15.85 doses of neoarsphenamine and mercury inunctions for 21.85 weeks.

(6) There was a reversal of the Kahn test in 56 per cent of 875 patients who had received neoarsphenamine and mercury.

(7) Of the males, 49.33 per cent gave a his-

tory of a primary lesion, while only 2.54 per cent of the females gave a similar history.

(8) Previous treatment had been almost nil and had been wholly inadequate.

(9) A history of one or more miscarriages was frequent amongst the infected females.

(10) The average cost per patient was about $10.65.

CONCLUSIONS

(1) Syphilis is extremely prevalent amongst the rural negroes in Alabama.

(2) Field clinics as a means of providing mass treatment are feasible if attached to a well functioning county health department.

REFERENCES

1. Wenger, O. C.; and Ricks, H. C.: The Public Health Aspect of Syphilis in the Negro Race in Certain Southern States. Sou. Med. Jour., 24: No. 6, June, 1931.

DISCUSSION (*Abstract*)

Dr. Taliaferro Clark, U. S. P. H. S., Washington, D. C.—When I approach the problem of the control of syphilis, I experience a sense of considerable discouragement because of the fact that we seem to be making such slow progress as compared with some other countries, particu arly the Scandinavian countries, which have been active and successful in their campaigns against this almost unconquerable menace.

It may interest you to know, in view of the very interesting point brought to light by Dr. Gill, some of the results of syphilis demonstrations made in five other states, with the financial assistance of the Rosenwald Fund. Before discussing them, I wish to emphasize particularly an important point made by Dr. Gill in his most excellent presentation; that is, the extensive prevalence of syphilis in this community. Thirty-six out of every one hundred individuals are afflicted with this disease, which in the aggregate is just as dangerous to life as any communicable disease we know. It kills more people than either tuberculosis or typhoid fever. It kills them just as dead but probably not so quickly. It constitutes approximately 11 per cent of the total annual admissions to our hospitals for the insane. In other words, it is a public health problem of prime importance. We are just beginning to see how tremendously important it is.

Another fact brought to light by Dr. Gill is the tremendous amount of congenital syphilis, 11 per cent among rural negroes as compared with 2.5 per cent estimated by competent authorities for the country as a whole. Dr. Gill has also given us some very encouraging data on the success obtained by complete courses of treatment. Sixty one per cent of all cases placed on intravenous medication received sterilizing doses of the arsenicals supplemented by mercury. I know of no institution in this country that comes anywhere near approaching this successful achievement.

Reversals of Wassermanns were brought about in 56 per cent of cases. That does not tell us much. We should like to know about how much arsenic was necessary to bring about a reversal of the Wassermann. This is now a subject for study by the Public Health Service in five of the leading clinics of the country, the results of which it is hoped to make public in the near future.

According to figures available up to the end of the last fiscal year, June 30, a total, roughly of 28,000 negroes were tested serologically, in the six demonstrations that have been carried on in as many Southern states, and of that number 5,700 were positive; of the whole group 21.5 per cent were positive. We were successful in treating 70 per cent of the positive ones. In addition to the 28,000 others came in to the various centers for treatment voluntarily and swelled the total of those examined to 32,000. This is quite a large number, considering the inability we experience in getting any large number of white people to come forward for treatment and to persist in treatment.

In Macon County, as Dr. Gill has said, the percentage of positive cases was 36 per 100 individuals. In Glynn County, Georgia, of 7,300 people examined, 26 per cent were positive; in Bolivar County, Mississippi, 24 per cent; in Pitt County, North Carolina, approximately 11,931 individuals were tested and 12.1 per cent were positive; in Tipton County, Tennessee, up to July 1, 1931, 25.9 per cent, and in the old State of Virginia, of 640 persons examined in Albemarle County, 6.5 per cent were positive. These figures lead us to the conclusion that syphilis is not peculiarly a racial disease, but is also influenced in large measure by environment and social standards.

It should be of interest to know how these data compare with the results of the one day census of cases under treatment in certain sections of the country that have been made by the Public Health Service in cooperation with state and local health departments during the past three years. The latest studies of this kind were made in Baltimore and Charleston, which show 8.4 cases of syphilis per 1,000 population under treatment; 4.8 per 1,000 population for the whites and 21.1 per 1,000 negroes.

It seems desirable at this point to mention the attitude of the Julius Rosenwald Fund toward the expansion of syphilis control activities on a statewide basis, in view of the generous financial support that made the Macon County, Alabama, project possible. At a meeting of the Board of Trustees, held on November 7, there was manifested continued interest in the control of syphilis among negroes, and also very special appreciation of measures that have been taken by the health authorities of the Southern states to combat this problem. The Fund is not prepared to announce a policy of cooperation in a program of state-wide control of this disease at the present time because of the desire to evaluate the results of the studies of the mass control of syphilis as represented by the Macon County project and to give further consideration to the possibility of working out a standardized administrative procedure. It would be helpful to the Fund to obtain expressions of opinion from this group of health officers as to a desirable state-wide program of control. In this connection, certain essentials to such a program occur to me, some of which may in part be applicable to the several states, varying, of course, with existing facilities and probable ability to carry out such a scheme during the present period of financial depression. Briefly these are: to obtain better reports of cases; to provide adequate diagnostic and treatment facilities; to maintain a follow-up service for the control of lapsing cases; to enlist the cooperation of all physicians to treat all cases in their infectious stages until they are no longer infectious; to appoint with the consent of local medical societies

and health officers cooperating clinicians at strategic points and to furnish them with drugs and other supplies necessary for the treatment of indigent and semi-indigent cases; to provide brief postgraduate courses in the diagnosis and treatment of syphilis for cooperating clinicians, local health officers, or other physicians in unorganized areas to such extent as may be possible for the purpose of insuring adequate treatment of syphilis; to encourage the making of routine Wassermanns in hospital and private practice, with special emphasis on the routine employment of this procedure in the case of expectant mothers for the prevention of still-births and congenital syphilitics; and to enlisting the cooperation of industry in combating syphilis among employes.

Dr. F. D. Milam, Nashville, Tenn.—I have been extremely interested in Dr. Gill's paper because we are making a similar study in Tennessee at the present time. In addition to the study, we have started a state-wide syphilis control program, which is carried on in many counties by the full-time county health officer.

The percentage of positive Wassermanns in our negroes in Tennessee is not quite so large as in Dr. Gill's group; it is 25 per cent as opposed to 36 per cent in Alabama.

Of course, we are always afraid of reactions, and we insist that every individual who receives an injection of an arsenical or mercury shall have a complete physical examination before treatment, particular emphasis being laid on examinations of kidney function, and examinations for heart and blood vessel disease. We have had so far in the study only one bad reaction.

In addition to the study in Tipton County, the program in Tennessee is getting the attention of industrial concerns in East Tennessee and two have asked that the same kind of Wassermann survey be made on their employes. In one plant, 1200 white employes had blood taken for Wassermann and of this group only 5 per cent were positive.

Dr. F. Michael Smith, Vicksburg, Miss.—It will be of interest if Dr. Gill will give us the reaction of the medical profession to the venereal clinics and the administration of neoarsphenamine by the health department. In Mississippi a definite program of public health activities has been set down by the State Health Department. This program does not permit the giving of any curative treatments. The policy of health work, as we understand it, is preventive, not curative. I should further be interested if Dr. Gill could inform us whether statistics tend to show that through free venereal clinics the incidence of syphilis has in any way been reduced. No one would fail to recognize that syphilis is a public health problem of great magnitude. But if we are true to the ethics of our profession, and we are the practitioners of preventive medicine, our problem is never to cure existing disease, but to prevent its recurrence, and when such recurrences are to be prevented only by cures it seems to me that it is up to us to obtain these cures through the medical profession, the practising physician, charity hospitals, paid clinics, and so on. Personally, I feel keenly the importance of a program different from the one presented to us in this paper. I note that the essayist states that at the time these venereal clinics were held, those who attended were immunized against typhoid and vaccinated against smallpox. In my humble opinion this is the best work they did. It was strictly preventive medicine, the legitimate work of a health department, and this part of the program I can heartily endorse as unquestionably public health activity, and a service to reduce the incidence of typhoid and smallpox, which cannot be called unethical by the general practitioner of medicine.

Dr. H. C. Ricks, Jackson, Miss.—A study similar to that reported by Dr. Gill was made by the Mississippi State Board of Health, the Julius Rosenwald Fund, the Delta and Pine Land Company and the United States Public Health Service, cooperating. It was made on the properties of the Delta and Pine Land Company, of Scott, Mississippi, and embraced approximately 2300 individuals. Of this number approximately 600 showed a positive blood Wassermann. In addition to the full-time physician already employed by the Delta and Pine Land Company, another physician and nurse were employed full time. All of the individuals showing positive Wassermanns were offered treatment without cost. The clinics for treatment were placed in locations convenient for the people in order to have the greatest number treated. Our results in persuading the individuals to take treatment were not so good as those obtained in Dr. Gill's study.

At the end of one year after the first Wassermann survey was made, a second survey was made. Of those individuals still remaining on the properties, who had a negative blood Wassermann at the time of the first survey, approximately 8 per cent showed a positive Wassermann at the time of the second survey. Of the 832 individuals who had moved onto the property since the first survey, 259, or approximately 25 per cent, showed a positive Wassermann. Just why these individuals had not applied for treatment, I am unable to say; the facilities for treatment were available and the entire population knew about it. Moreover, the physicians and nurse had a sympathetic attitude toward the negroes. It is quite probable that Dr. Gill will find similar results if he makes a second survey of his population.

I believe these people should be treated. Just how to reach them is the problem to be solved. Possibly the expectant mother would give us the best starting point.

Dr. E. L. Bishop, Nashville, Tenn.—Public health work on syphilis is in the experimental stage. We have not established policies; we are trying to find ways of shaping policies. I presume you desire in other states, as in Tennessee, the cooperation of the medical profession. In Tennessee, we brought the whole question before the medical societies. They approved of the program's being carried on and it has been carried on with their continued approval.

Dr. A. T. McCormack, Louisville, Ky.—If 25 to 50 per cent of persons are infected with any disease, then the medical organziation in the particular community in which such a situation exists is responsible for the condition. The problem has to be taken to our physicians, with a view to fixing the responsibility on them, and whatever steps are necessary to relieve the condition have to be taken.

In Kentucky, 82 clinics and 82 county organizations work with the various county societies. The physician giving treatment is added to the personnel of the health department. We have been extremely successful in carrying through the program Dr. Clark laid out for us. We obtained it from him.

If the profession is willing to treat these cases it is well; but they must be treated. If the profession is not willing to do it as a profession, not willing to treat all cases, it is up to us to do it, as a health department. The law makes that our responsibility and we are carrying it through. With more money we could

carry it through better and furnish remedial agents to physicians to treat indigent cases. Studies of the incidence of syphilis arm us with necessary facts to go to the profession and insist on cooperation and reorganization in such a way that all cases are treated in their respective communities. When we send the cases to the physicians' offices, they soon get religion and want the work done by someone else because we crowd their offices with indigent syphilitic patients.

We know we have less syphilis in Kentucky because in counties where clinics are carried on (Boyd County for example), prostitutes are free from syphilis. We are finding less syphilis in young people, white and black.

Dr. J. A. Hayne, Columbia, S. C.—I hesitate to take issue in regard to this matter, but I certainly have to do so.

We are either going to be fish or good red hen. We cannot be doctors of preventive medicine and doctors of curative medicine at the same time. We have to draw a distinct line between curative medicine and preventive medicine. Every physician realizes that syphilis is the most important disease in medicine. The inclusion or exclusion of syphilis from every diagnosis is necessary to every practising physician.

It is our duty as health officers to bring to the medical profession statistics, and to demand of them that they do the work that they are supposed to do. It is not our duty to take over their work and cure syphilitics. It is our duty to find out how many cases there are of syphilis; how many deaths from syphilis and all other statistics and present them to the medical societies, but not to treat cases ourselves.

Dr. Gill (closing).—This paper, of course, is merely a presentation of some experimental work carried out in Alabama and does not presume to cover all aspects of syphilis. This project, and all our venereal disease work, the county medical society discussed and approved before it was undertaken.

RENAL GLYCOSURIA IN A COLORED WOMAN WITH OBSERVATIONS DURING PREGNANCY*

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and
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Diabetes in the negro race has been studied by Lemann[1], Bowcock[2] and Leopold,[3] but the presence of benign glycosuria in a colored individual has not been recorded.

The following case report displays persistent benign glycosuria in a colored patient with observations during pregnancy. The temporary existence of benign low threshold glycosuria (renal glycosuria of pregnancy) has been described in the white race. This condition disappears after pregnancy. Bowcock and Greene[4] and Bowcock[5] have recorded the only case of true persistent renal glycosuria in which observations were made during pregnancy, the puerperium and later. This case is the second of the latter type to be reported.

A. G., aged 18, negro, female, single, was admitted to the Grady Hospital Emory University Service, August 28, 1929, because of sore throat, choking sensations, nausea and vomiting of a duration of four days.

The family history was unimportant. The past history was essentially normal and the patient stated that she had menstruated regularly. The story of the present illness was unimportant aside from the facts noted in the admission complaints.

The positive findings in the physical examination were evidence of acute tonsillitis and pharyngitis and an enlarged soft cervix and uterus suggestive of pregnancy in the third month. Nutrition was normal and there had been no weight loss; the weight was 110 pounds (50.0 kg.). There was no fever.

An admission specimen of urine gave a strong reduction of Benedict's solution on testing for sugar and a strong reaction for acetone. A complete blood count showed nothing unusual except that the leucocyte count was 14,700 with 82 per cent neurophilic leucocytes. The blood Wassermann reaction was negative. Several fasting venous blood sugar determinations gave figures between 71 and 80 mg. per 100 c. c. of blood, and simultaneously collected urine specimens contained sugar. The blood sugar two hours after an unrestricted meal was 0.105 per cent, and a simultaneous specimen of urine contained a large amount of reducing substance. Five 24 hour specimens of urine contained an almost identical amount of sugar, averaging 19.0 grams per day. The reducing substance reduced Benedict's and Nylander's solutions, formed osazone crystals with phenylhydrazine, gave a negative Seliwanoff reaction for levulose, and a negative orcin reaction for pentose. Quantitative reduction with Benedict's reagent was 1.1 per cent; dextrorotation of the same specimen in the polariscope was 1.0 per cent and quantitative fermentation with yeast was 1.0 per cent. The reducing and optically active substance was completely destroyed by fermentation and the gas bubble was absorbed by potassium hydroxide.

On September 8, the blood sugar response to the administration of 50.0 grams of glucose by mouth was determined on capillary blood by the Folin-Malmros modification of the micro method of Folin; the results of this test which are given in *Table 1* show a response which is characteristic of a benign type of glycosuria. At no time did the blood sugar exceed a normal value and all specimens of urine contained sugar. Tonsillectomy was performed, followed by an uneventful recovery.

Table 1

	Blood Sugar in Mg. per 100 c. c.	Urine Volume	Urine Sugar in Grams
Fasting	69	164 c. c.	1.64
50 grams glucose in 400 c. c. water and juice of one lemon			
20 min. after glucose	101	25 c. c.	0.72
40 min. after glucose	128	14 c. c.	0.64
1 hour after glucose	133	16 c. c.	0.99
2 hours after glucose	84	31 c. c.	0.77
3 hours after glucose	65	11 c. c.	0.28
Total sugar excreted after glucose			3.4

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*From the Grady Hospital and the Department of Biochemistry, Emory University.

About six months after this hospital admission the patient was delivered of a normal baby in an adjoining city.

The patient was readmitted to the Grady Hospital, March 19, 1931, because of nausea and vomiting, mild pyelitis, and threatened abortion. On March 21, abortion of a two months fetus and placenta occurred. Several specimens of urine contained sugar and blood sugar determinations gave normal values.

On April 27, 1931, a little more than a month after the preceding pregnancy a second glucose tolerance test was performed following the administration of 100 grams of glucose, by the method of Folin and Wu on venous blood. The results, *Table 2*, were typical of benign glycosuria. The patient's weight was 118 pounds (53.6 kg.).

Table 2

	Blood Sugar in Mg. per 100 c. c.	Urine Volume	Urine Sugar in Grams
Fasting	91	54 c. c.	1 plus
100 grams glucose in 400 c. c. water and juice of one lemon			
20 min. after glucose	118	25 c. c.	2 plus
40 min. after glucose	141	74 c. c.	2 plus
1 hour after glucose	130	184 c. c.	3 plus
2 hours after glucose	89	142 c. c.	4 plus
3 hours after glucose	93	88 c. c.	3 plus
Total volume urine containing sugar		567 c. c.	1.0%—5.6 gm.

March 5, 1932, a second normal baby was born at the Grady Hospital; the birth weight was 7 pounds 2½ ounces (3,250 grams). The mother made an uneventful recovery. One blood sugar determination gave a normal value.

The foregoing case presents an instance of persistent benign glycosuria in a negro. The condition is known to have been present for over 2½ years, during which time the patient remained in good health, maintained a normal state of nutrition and went through with two normal pregnancies, an abortion, tonsillectomy and two acute infections without injury to her mode of carbohydrate metabolism. The reducing substance in the urine received sufficient study to permit its clinical classification as glucose.

We shall report later the occurrence of combined benign levulosuria and glycosuria in a colored male. The observations on diabetes, renal glycosuria and levulosuria suggest that the colored race is subject to the same anomalies of carbohydrate metabolism as the white race.

BIBLIOGRAPHY

1. Lemann, I. I.: Diabetes Mellitus Among the Negroes. New Orleans Med. & Surg. Jour., 63, 1911.
Diabetes Mellitus in the Negro Race. Sou. Med. Jour., 14:522, July, 1921.
Diabetic Gangrene in the South. J.A.M.A., 89:569, August 27, 1927.
2. Bowcock, H. M.: Diabetes Mellitus in the Negro Race: A Study of One Hundred Consecutive Cases. Sou. Med. Jour., 21:994, Dec., 1928.
3. Leopold, E. J.: Diabetes in the Negro Race. Ann. Int. Med., 5:285, Sept., 1931.
4. Bowcock, H. M.; and Greene, E. H.: Observations in a Case of Renal Glycosuria During and After Pregnancy. J.A.M.A., 90:502, Feb. 18, 1928.
5. Bowcock, H. M.: Familial Glycosuria: Report of a Large Family. Case 26. Ann. Int. Med., 2:923, March, 1929.

THE USE OF EXPERIMENTAL PROCEDURES IN TEACHING PATHOLOGY*

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Modern medicine has become well aware of the benefits which physiology through physics and chemistry has bestowed upon it in the past fifty years. Medical men have also learned that the power of the practitioner is largely dependent upon the knowledge of disease which is gained through the application of the scientific experimental method. The observational method of science, while extensively informative, does not teach us immediately to control causes, nor to interfere actively in combating disease, consequently does not equip the medical practitioner with knowledge that is power.

Until comparatively recently, if not now, medical science was more actively concerned with attempts to understand disease than with controlling it, for the simple reason that scientifically speaking we must understand before we can treat, except empirically; but modern discoveries in the fields of etiology, immunity and physiology, broadly speaking, have shifted the emphasis upon active scientific interference in our attitude toward disease.

Therefore it is not surprising that added stress should be laid upon experimental procedures, upon function and upon the living animal as proper subjects for study by the medical student who is seeking knowledge of disease, that is, pathology in its complete sense, which can be observed only in the living changing organism.

Furthermore, with the development of medical knowledge along physiological, chemical, bacteriological and immunological lines, clinical medicine has found it necessary to add to its professional armamentarium many technical methods and procedures for diagnostic and therapeutic purposes.

The use of these specialized experimental procedures has generated a new medical sub-guild, the clinical pathologists, whose methods embrace histological, bacteriological, serological and biochemical procedures. This group of medical men

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*From the Vanderbilt University Medical School, Department of Pathology.

represented by special associations, such as the American Society of Clinical Pathologists, are numbered among the pathologists; and their subject matter is considered to be a part at least of the general subject of pathology.

Since the technical procedures employed by the clinical pathologist are so useful to the medical practitioner, and because their use falls under the general head of pathology, it is again not surprising that there should be advocates, particularly amongst medical practitioners, for instruction in these methods during the preclinical years, and perhaps naturally as a part of the course in pathology. This conception, I believe, is largely responsible for the recent statement by a pathologist that, for teaching purposes, the personnel of a modern department of pathology should include, in addition to members experienced in clinical medicine, a physiologist, a biochemist, a bacteriologist, and an immunologist.

It thus seems obvious that in a discussion of the subject which has been assigned me, namely, the use of experimental procedures in teaching pathology, there must be a definition of terms. This is a broad theme, and in order to avoid discursiveness and confusion in the short time at my disposal, I should like to limit the scope of my remarks by rather strict definitions of the phases of the general subject to which I should like to direct your attention.

One may construe pathology in a broad sense to include knowledge of all of the phenomena of disease, anatomical alteration as well as physiological derangement. In this general sense pathology would embody practically all of clinical medicine. It would seem obvious that in this discussion the term pathology should be used in a restricted sense to refer to that branch of medicine which is set apart in the curriculum for undergraduate students and usually given in the second year of their course, serving to introduce them to the phenomena of disease in preparation for clinical studies. My consideration of the subject will therefore be confined to a discussion of the problem of the use of experimental procedures in teaching pathology to undergraduate medical students in preparation for their clinical years. More concretely, the problem calls for a judgment as to the best method of laying a foundation for the student in preparation for the study of disease in the living patient, that is, in the clinic. Would it be best to devote the curricular hours allotted to pathology to a study of gross and microscopic morbid anatomy, to a study of deranged function, or to a combination of the two?

One should in this connection consider what may be implied in the phrase experimental procedures as applied to teaching pathology. Briefly, experimental procedures may be undertaken in order to demonstrate in animals anatomical lesions illustrative of pathological processes. In this sense the experimental procedure would be used as an aid to the study of morbid anatomy. Experimental procedures may also be used to induce disease in the living animal and be applied to a study of deranged function in such animals as well as in sick human beings, with or without regard to morbid anatomy. Lastly, experimental procedures may be used to solve problems of disease according to the rules of experimental biological science.

I think for present purposes one may dismiss from consideration the use of experimental procedures for the demonstration of morbid anatomy and for research as a general method in the teaching of pathology to undergraduate students. In general I believe one will agree that morbid anatomy may best be taught by dissection of the human body at autopsy. In exceptional instances where human material may not be obtained, the use of lower animals could of course be resorted to with profit. Experimental research as a general means of teaching a curricular course in pathology is obviously also out of the question, though I am far from prepared to exclude the occasional student from engaging in investigative work in addition to his curricular courses.

With this rather summary elimination of the two above mentioned uses of experimental procedures, there is left the possibility of employing them, as a part of the curricular course in pathology, to induce disease in animals and to study the abnormality of functions in the living animal in conjunction with or separate from the teaching of morbid anatomy. I believe it is admitted even by the strongest advocates of the so-called physiological or experimental method of teaching pathology that a foundation in morbid anatomy is still advisable if not essential. I presume even the most radical advocate of the use of functional pathology for teaching would not be willing to discard morbid anatomy as a premedical discipline.

It would seem, however, that even some teachers of pathology believe that the morbid anato-

mist falls far short of his duty or at least of what is expected of him, if he confines his instruction to pathological anatomy. Some of our pathologists, evidently in response to this feeling, advocate the introduction of special courses to undergraduate medical students in so-called experimental pathology, such as that organized by the late Prof. Pearce. Others, notably Prof. Karsner, emphasize the need of supplementing morbid anatomy with animal experiments for the study of function concurrently.

"The advantage of including studies of function in the course in pathology is twofold," says Dr. Karsner, "in that such a procedure makes the subject a living subject and at the same time is of great value in the development of a well trained graduate."[1]

Overlooking the lack of specificity in the latter reason, the former clearly implies that morbid anatomy alone is a dead, and if one may read between the lines, an insufficient medical discipline.

In spite of his enthusiastic advocacy of experimental functional pathology, Dr. Karsner's real estimate of it as an educational procedure is not altogether reassuring. He says:

"If, however, the student is limited to observation on animals, he is likely to lose sight of the application to human medicine, in spite of the most earnest direction of his teachers. Therefore a certain amount of clinical correlation should be attempted. As an example, one might say that listening to a heart murmur produced artificially in a dog would have relatively little significance unless the student is able to listen to a murmur in a living patient. Correspondingly, the study of alteration of secretory effectiveness of the kidney in an artificially produced nephritis is of little value unless the student can be shown the same sort of test as applied to human cases of nephritis."

Imagine the necessity of using human disease to teach the student the meaning of experimental pathology in animals! More recent advocates of the teaching of functional pathology by animal experimentation and other means are Professors Pack and Brooks. While they do not wish to underestimate or belittle the relative importance of the anatomical aspect of pathology, they "do decry the neglect to present pathologic physiology in a coordinated, purposive manner". But they proceed to make the following illuminating admission, to which I adhere:

"One cannot divorce structure and function in presentation or thought, any more than they can be divorced in state of being, because they are mutually dependent."[2]

These authors thus maintain, as would I, that morbid anatomy inevitably has its physiologic content. They might have added, however, that while function cannot be taught or viewed apart from structure, morbid anatomy may be studied and presented and its physiological significance appreciated in the absence of coincident functional activity. This, I think, is a great educational advantage, which has been proven historically.

It is far from my purpose to disparage the teaching of the pathology of function, but there are two points of view which have been brought forward by the advocates of functional pathology as a part of the curricular course upon which I should like to comment. In the first place, as I have already intimated, there is no avoiding the implication by these advocates that morbid anatomy alone is insufficient as a medical discipline.

This is due to a failure to realize the full significance of anatomical pathology. The lesions of disease as manifested in the dead body bring us very close to fundamental problems of disorganized and mal-functioning living organisms, and we can never get very far away from the cellular and organic changes which are to be seen in the dead animal without the risk of going astray in our efforts to solve the problems of disease in the living. The discipline of morbid anatomy is a basic one whether we are concerned with etiology, function, classification and natural history of disease, or with the interpretation of symptoms and signs in an effort to arrive at a diagnosis in medical practice.

A sound training in this subject I regard as fundamental in the present state of knowledge to a proper approach to the study of disease in the living and there is no substitute for it, nor may it be advisedly neglected even for more extensive work along physiological lines. The autopsy is still the backbone of medical education in a broad sense.

The anatomical lesions associated with disease cannot intelligently be viewed apart from concepts of function in some aspect or degree any more than can gross anatomy and histology. Pathologic morphology is ever rich and essentially so in physiologic suggestions and problems which should arouse the curiosity and direct the interest of the intelligent medical student toward the living and sick patient, and finally lead him back again to the postmortem room.

In addition to the physiological content inherent in morbid anatomy, there is its etiological

aspect. Physiology and even bacteriology individually can teach the student relatively little as yet about the interaction between the human host and invading pathogenic microorganisms. Pathologic histology has taught us much and the field is far from exhausted. The instances among microbic infections where diseases comparable to those in human beings can be induced in lower animals are limited, and in no case can lesions be induced so significant for teaching purposes as those to be found in the human body. In addition to microorganisms, etiology may frequently be demonstrated or suggested by the lesion itself, by the destruction or obstruction of tissues and viscera.

Through the cultivation of morbid anatomy has medicine largely been able to identify and classify disease entities, thus simplifying by arrangement the complex phenomena of disease and rendering possible both the clinical diagnosis, prognosis and a further analysis of physiologic function. The factual material of morbid anatomy has thus not only its purely morphologic aspects, but also its physiologic, etiologic and taxonomic content.

Furthermore, it is in accurate observation that the educational value of morbid anatomy in contradistinction to the informative or factual phase of the subject is to be found. To observe carefully, accurately and critically is the very essence of scientific procedure, whether in the postmortem room, the physiologic laboratory or the clinic; and in the cultivation of morbid anatomy the student may obtain invaluable experience in observation. It is not an easy matter to get hold of a fact, stripped of its accessories and unessentials, distinguished from subjective interpretational implications—a fact, in other words, which may serve impersonally as a basis for use in the experimental method. Morbid anatomy offers in the medical curriculum an unexcelled opportunity for the medical student to experience the finding of fact by the method of critical observation.

In what I have said I intend to express the judgment that morbid anatomy as a discipline for undergraduate medical students can justify the allotment of all the time in the curriculum given to it in our modern medical schools and more, without the necessity of dissipating any of its hours upon the demonstration of animal experiments or requiring the use of any so-called experimental procedure other than those which may be utilized in aiding observation of the phenomena presented by the dead body.

The great desideratum, however, for the conduct of the most useful course in morbid anatomy is a sufficient number of autopsies, and the more the better, provided there is an appropriate staff of pathologists and adequate equipment to conduct them with thoroughness.

I do not feel that so-called correlative courses, devised to study the physiology of disease as induced in lower animals and conceived as a logical pathway to the clinic, are needed or advisable. If such time as would be required for a course of this nature be available, it seems to me that the student is in so much robbed of the opportunities of the clinic.

Admitting the importance of morbid anatomy, the second viewpoint upon which I should like to comment is the idea that the curricular course in pathology is the place to teach the student, by so-called experimental procedures, the functional pathology of disease in the living animal.

We are, no doubt, all agreed that the purpose of medical education is to prepare students to deal intelligently with diseased human beings, that is to say human beings who are suffering a derangement of function. Function, however, cannot be known or viewed apart from the substantial living body, and the study of altered form, particularly when analyzed into its histological and cytological components, cannot be devoid of physiological content.

By a natural process of development, common consent has resulted in our educational procedures evolving in the medical curriculum from the relatively simple to the more complex. This has resulted in a gross division of a four-year medical course into two fairly equal time periods. The first two years are devoted in general to analytical or simplified phases of medical problems: to anatomy, histology, chemistry, physiology, morbid anatomy, bacteriology and immunity. The student then proceeds to the more complex phenomena of disease as manifested in the sick human being.

During his first two years the medical student has had an opportunity to learn something about the structure of the human body in health and in disease, he has learned some of the principles and technical procedures of chem-

istry and physiology. Consequently he approaches the last two years in the clinic with a preparation designed to prepare him for a study of disease in the living human being, that is, for a study of deranged function. Much of his work in the clinical years has to do with diagnosis, a taxonomic procedure, and the basis of much of his diagnosis is morbid anatomy. In a large proportion of cases his major interest is etiology, about which he has learned something in morbid anatomy as well as in bacteriology. In other cases he is particularly concerned with morbid anatomy and histology, as in malignant diseases, and is often dependent in the end upon morphology for his diagnosis, prognosis and treatment.

But there are other cases where his chief concern is an investigation of disturbed function which must be elucidated by experimental procedures, particularly those of chemistry, physiology, bacteriology and immunology.

He has presumably become acquainted with these procedures in his preclinical years and now he is called upon to apply them to the study of disease in the living human being. Thus it seems to me that the place and time for the student to apply most effectively experimental procedures to the study of pathological function is in the two clinical and not in his preclinical years, and his material should be so far as possible sick human beings.

Throughout this discussion I have confined myself to a consideration of the preparation of students for the practice of medicine. I have not considered the use of experimental procedures from the standpoint of pursuing medical research or in training undergraduate and postgraduate students for careers in medical teaching and investigation.

These I regard as entirely different problems, requiring an intensive and not an extensive training. For the problems of the medical practitioner and those of the medical investigator are different and require a different mode of attack.

It would perhaps have been more appropriate for our title had Dr. Lynch chosen a stronger advocate for the use of experimental procedures in teaching pathology if my interpretation of its meaning has been correct. As it is, I feel myself on the defensive, inasmuch as I believe that no sacrifices should be made in teaching morbid anatomy in our modern medical schools, even though realizing the great importance of the use of experimental procedures in the study of disease. I conceive morbid anatomy to be of essential importance in the education of a physician and too large a subject to be adequately taught in the time allotted to it by the exigencies of modern medical education. Rather than see this important discipline minimized by an external arrangement of curricular hours, or curtailed by an internal encroachment upon its time by the introduction of physiological experiments, important but misplaced, I would prefer to see teachers of undergraduate pathology fully appreciative of the value of morbid anatomy as a discipline worthy of their best efforts and large enough to exceed their most earnest attempts to exhaust it in any circumscribed curricular course.

There is abroad, even in the ranks of teachers of pathology, an idea that morbid anatomy has lost something of its historic importance as a medical discipline, because of the more active cultivation in recent times of the chemical and physiological aspects of disease. Certain teachers of pathology have felt the physiological pressure of modern times and have responded by adopting more or less the methods of the physiologist through animal experimentation in presenting their subject to the students. I find that in the curricular time allotted, which I think is reasonable, I cannot teach the student a fraction of the morbid anatomy he should know. I cannot even give him an adequate experience in the technic of performing an autopsy. Naturally, then, am I not disposed to turn aside to introduce further distractions into the course. I do not feel as some pathologists claim to feel, that I am negligent of my duty or remiss in my responsibility to the student if I fail to teach him experimentally the physics and chemistry of disease. Rather am I inclined to intensify his experience for the time being, to the end that he acquire perhaps more respect for the value of a knowledge of morbid anatomy and its contributions to modern medicine and to experimental biological science.

REFERENCES

1. Karsner, H. T.: J.A.M.A., 75:361, 1920.
2. Pack, G. T.; and Brooks, Clyde: Jour. Ass'n. Amer. Med. Coll., 4:160, 1929.

Discussion follows paper of Dr. Brindley, page 997.

THE USE OF THE AUTOPSY IN THE TEACHING OF INTERNS*

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In preparing a discussion on this subject I have evoked the aid of pathologists in one hundred hospitals of the South and Southwest, these hospitals being among those approved for internship by the Council on Medical Education and Hospitals of the American Medical Association. One hundred questionnaires were mailed to the pathologists of these institutions. Sixty-eight replies were received. A summation as nearly as possible of the data and ideas obtained from these questionnaires, along with a few of the author's own opinions, form the basis of this paper. In considering the relationship of the interns to the necropsies, two questions will be kept in mind. First, what is their present relationship to the autopsy service; and second, what would be the most advisable arrangement?

The attendance of interns at autopsies may be dismissed with a brief consideration. Two-thirds of the hospitals require attendance and most of them state that the interns are present at the majority of necropsies either by requirement or voluntarily. Interns should be present at every autopsy possible, and to encourage and facilitate this the examination should, if possible, be made at an hour when they have the smallest number of conflicting duties.

Who performs the autopsies in the approved hospitals of today? In answer to this question it was found that 78 per cent are performed by the pathologists, 14 per cent by interns and 8 per cent by others, usually residents. In exactly half of the institutions the pathologist makes all of the examinations; in an additional fifth he performs 90 per cent or more of the autopsies. In only six hospitals do the interns perform a majority of the postmortems, these being done under the supervision of the pathologist. Which is the best arrangement? Should an intern perform the autopsy, should he assist, or should he be unconcerned in the matter? Of the answers mentioning the various phases of this question, 55 per cent believe that the intern should assist, one-third think he should do them under the pathologist's supervision, while 11 per cent doubt the advisability of placing such duties upon him.

With an adequate pathological staff it would probably be advisable for each fifth-year man to assist in three or four necropsies and then perform an equal number under supervision; this in order that he may acquire a knowledge of the routine methods employed. However, the average intern should not be depended upon to interpret the findings of an autopsy. The time element is not infrequently a serious drawback to interns performing autopsies. Since it requires much longer for an inexperienced person to make an examination than it does for the pathologist, such a method can easily make serious demands upon his time. Also it is well to remember that the attending clinicians usually want the lesions demonstrated as soon as possible.

In considering the question of the intern being responsible for microscopic examination of necropsy tissues, it is interesting that in more than two-thirds of the hospitals he does not perform such examinations. Only eight pathologists specifically advised that such duties be required of him. It seems doubtful that the average intern, with his already multitudinous duties, can wisely devote sufficient time for microscopic and bacteriologic studies of necropsy tissues. Whether or not he should prepare the protocol occupies much the same position as does the question of microscopic and bacteriologic examination. In 61 per cent of the hospitals he is not concerned, while in 39 per cent he is either responsible or assists in their preparation. I do not believe that such duties are advisable for an intern unless he be on a definite pathological service.

What is the present status of clinical and pathological conferences? In 52 out of 68 hospitals, conferences are held at the postmortem table; in 10, occasional or partial discussions are held; 5 hold no discussions either prior to or during the autopsy. A third consider postmortem room conferences advisable. None object to these. It would seem proper whenever possible for the intern who attended the case to present the clinical history and to participate in the clinical and pathological discussions at the time of necropsy.

In the majority of hospitals more formal clinical and pathological conferences are held weekly, monthly or at other intervals, about 60 per cent of the cases which have come to necropsy being presented at these later conferences. In 31 per cent of the hospitals such con-

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ferences are held weekly, while in 44 per cent they are of monthly occurrence. Forty-nine hospitals report that clinical and pathological conferences are held in conjunction with their staff meetings.

The degree of participation by the intern in these conferences varies with the different hospitals. In 61 per cent he presents the clinical findings; in 44 per cent he enters into the discussion; while in approximately a fifth of the hospitals he demonstrates the pathological findings. In my opinion, it is more advisable for the intern to present the clinical history than the necropsy findings. He should also participate in the discussion of the case. A clear-cut presentation and discussion of the pathological findings and their clinical correlation by a capable pathologist has the greatest value in teaching this phase of the case. Of course, the chief of the clinical service should also be present to enter into the discussion.

In conclusion, let me give some views of various pathologists upon the subject of intern instruction: Dr. J. W. Lindsay, of the Garfield and Children's Hospitals, Washington, D. C., suggests that all autopsy material be set up for general study in connection with the clinical records and bacteriological and tissue slides. Those interns directly interested should be urged, or required if necessary, to study these cases.

Dr. G. T. Caldwell, Baylor Hospital, Dallas, thinks the ideal way would be to have the intern responsible for the performance of the autopsy and the completion of the record in those cases on his house service, the work to be done, however, under the direction of a pathologist and the material so obtained presented at frequent conferences. On the other hand, Dr. Kenneth M. Lynch, of the Roper Hospital, Charleston, believes that interns gain little from doing the autopsies themselves.

Dr. P. E. McNabb, Major in the Medical Corps, Washington, has been a pathologist and teacher of interns in several hospitals. He discusses the question of intern training in pathology very forcefully. He says:

"I have given much thought to the subject in the last six years and have observed or been responsible for it in four different hospitals where local conditions were very different. I have concluded that there is no one best way and that standardization is impracticable. The length of the internship, the time of the intern available for pathology, the number of autopsies per year; the time the pathologist can devote to teaching the intern, must be taken into consideration and each problem has a different solution."

He goes on to say that he believes the ideal plan to be one in which a few cases are thoroughly studied by a given intern, who, according to this method, should be able to complete three or four such studies in as many months. He felt that both the pathologist and intern should have plenty of time to carry out such an arrangement.

But, after all, as Dr. McNabb explains:

"We aren't training pathologists but doctors who often will never see a histological section after they complete a few weeks in the laboratory. Is the time necessary to review histology and histopathology a luxury for a year intern when there are so many necessities he can hardly hope to get? Gross pathology is the basis for most physical signs and therefore very valuable. A correlation of the gross and clinical findings at the autopsy table while every one is interested is, I believe, the most valuable teaching point of the autopsy."

The following plan, which he sets forth as being used in three large hospitals, is of unusual interest:

"The clinical staff is notified that there will be an autopsy demonstration at 11:30 a. m. Meanwhile, the pathologist and the intern on duty in the laboratory do the prosection in the presence of the physician or surgeon who had charge of the case. All organs are removed and sectioned, smears and frozen sections are made if indicated and every thing is in readiness for a clinico-pathological conference when the entire staff arrives at 11:30. The case is fresh in the minds of the clinicians and they discuss it briskly, see the lesions and lose a minimum of time from their work."

Such a plan, in my opinion, is worthy of trial in other hospitals, although, as Dr. McNabb says, conditions vary so widely in the different institutions that standardization is impracticable if not impossible.

920 Avenue B

DISCUSSION (*Abstract*)

Papers of Dr. Goodpasture and Dr. Brindley.

Dr. Harry C. Schmeisser, Memphis, Tenn.—Some years ago, my professor of pathology and chief, Dr. William H. Welch, said to me:

"There is a great tendency at this time for pathologists to specialize in chemical pathology, experimental pathology, functional pathology and clinical pathology, setting aside anatomical pathology. This I consider a great mistake. Anatomical pathology is and will remain a basic science, necessary to prepare the medical student for his clinical years, indispensable to the graduate and far from being exhausted of interest to the man engaged in research. You will experience a renewed appreciation of anatomical pathology and a demand for anatomical pathologists. I have already brought this to the attention of MacCallum, Winterwitz and Goodpasture."

Following my beloved Chief's advice, I remained an anatomical pathologist and I think the time he predicted has come. Anatomical pathology is again appreciated, and it is a renewed source of important original contributions. I need only mention as an example, the excellent work on nephritis by Bell and his co-workers.

I am quite in sympathy with the opinion expressed in Dr. Goodpasture's paper that there is neither need nor time to use experimental procedures during the pre-

clinical pathological course usually given to sophomore medical students. It is better to teach from human lesions. Those produced in animals are often different from those of the same disease in human beings. I do not see why the course in physical diagnosis should not teach the student functional pathology. The time allotted to this sophomore course is needed to cover the essentials in anatomical and histological pathology without introducing any experimental works. Experimental pathology might be given as a special or elective course, later, possibly in the junior year. A student being prepared to do research work would profit greatly by such a course.

As Dr. Brindley said, the autopsy is an excellent means of teaching interns We have in our teaching hospital, the Memphis General Hospital, an eighteen-month, rotating, graduating intern service. The first three months the intern is assigned, full time, to the laboratory. The first month he is under the jurisdiction of the Division of Laboratories. He assists at autopsies, the assistant resident, resident or visiting pathologist. He writes up the protocol under supervision and works up the histological pathology of some cases.

Every afternoon, except Saturdays, Sundays and holidays, the Division of Laboratories has a Pathological Conference, from 1:05 to 2 p. m. in our autopsy room, conducted by myself, at which time the surgical and autopsy material of the previous 24 hours is studied and described. The intern acts as scribe and he is assigned the microscopic study of some of the simpler specimens.

This conference is followed on Fridays from 2 to 3 p. m. by a histopathological conference in the laboratory. The more interesting microscopic sections of the week's material are first projected on the screen and demonstrated by myself and later studied in detail under the individual microscopes. The intern is required to attend these conferences. He also has minor duties in clinical pathology and bacteriology.

In the second and third months of internship the intern is still a laboratory intern, but he now devotes less time to anatomical pathology and more to clinical pathology. He is responsible, in the execution of the routine tests, to the clinical interns and residents. For the advanced tests he is still responsible to the Division of Laboratories.

Dr. Stuart Graves, Tuscaloosa, Ala.—One of the most essential factors in obtaining the cooperation of the clinical staff in securing autopsies is a prompt, thorough, orderly, scientific presentation of the autopsy findings in the least possible time. It seems to me highly desirable to have the clinical staff at the autopsy, if that can be conveniently arranged, because many times a suggestion based on the history or on the physical signs and symptoms will guide the pathologist to correct conclusions. If that assumption is correct, it is hard to see how an intern with no experience, or possibly a month or two of experience, can do an autopsy in a way which will be satisfactory to the clinical staff, not to mention the pathological staff.

A clinical intern is not usually competent to do autopsies. If an experienced pathologist is at his elbow to guide him, mistakes will be reduced to a minimum; but the time and effort necessary on the part of the experienced pathologist is hardly worth while if he is to do the same for frequently rotated clinical interns.

The importance of technic for autopsies is unfortunately sometimes not sufficiently appreciated, just as the importance of favorable location and good light for the performance of autopsies is not sufficiently appreciated. There has been a tendency to shove autopsies off into obscure rooms where proper light is not available, and to leave them to the hands of inexperienced persons. If autopsies are worth doing at all, they are worth doing well; and the technic for a thorough autopsy is not easily mastered. Even the matter of tissue fixation needs constant supervision. Supplementary microscopic examinations depend largely upon correct fixation. Bacteriological technic, if carried out by an inexperienced person, is almost worse than useless. The autopsy record should certainly be written with an eye to accurate observation, clearness and brevity; and, we might add, with some regard for literary style, at least good English. Finally no autopsy can be complete unless histological findings and bacteriological findings are accurate and properly correlated with the clinical findings. That, again, necessitates long experience and great skill.

I wonder how the surgeons would feel if pathological interns were called out of the laboratory to assist them in the operating room for periods of two months only. Could such assistants possibly be satisfactory to the surgeons or learn much themselves?

It seems to me best to consider pathology of equal importance with other specialties in medicine and for men anxious to learn pathology to take appointments in pathological laboratories for periods of time sufficient for the directing pathologist to train them properly. A desirable service in a pathological laboratory should be for not less than one year. Then from a group of pathological interns one or two, according to the size of the service, should be chosen as residents for one or two or three years longer. Such services would train needed pathologists and insure better work for the clinicians.

When Dr. Goodpasture emphasizes the importance of pathologic anatomy, he means of course gross and microscopic anatomy. No person can make gross observations which will prove correct in a large number of cases unless he carries the tissues through and makes histological studies and interprets gross findings in the light of those microscopic studies. If that is done accurately, it is hard to conceive of any experience which will teach the physician to observe more carefully and record more accurately.

Dr. Kenneth M. Lynch, Charleston, S. C.—Three essayists were provided for a definite purpose and fitted together to take up different angles of the main proposition, the renewing of the presentation of morbid anatomy as a thing which has in recent years perhaps been attended to not so well as it should be. Dr. Goodpasture expressed himself as feeling on the defensive about the use of experimental measures in the teaching of the ordinary, regulation undergraduate course in pathology. I think he need not have felt any defensiveness in this gathering, but there have been times when he or anyone else who would have presented the matter as forcibly as he did would have been on the defensive, and I myself have in years past had the feeling that I was old-fashioned beyond my years.

I believe that morbid anatomy must be the keystone on which the pathologist rests all of his work.

Dr. Brindley (closing).—I thoroughly agree that morbid anatomy and histopathology are fundamental in the study of pathology. An understanding of these forms a basis for the teaching of functional pathology and the correlation of the lesions of a disease with its clinical manifestations.

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EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Twenty-Sixth Annual Meeting
Birmingham, Alabama, November 16-18, 1932

THE BIRMINGHAM MEETING

With the annual meeting of the Southern Medical Association only two and a half months away, the Birmingham profession is wondering what the attendance will be. From room reservations and letters and word from various parts of the South, it looks as though the 1932 gathering may register a record-breaking attendance. Birmingham is almost exactly the geographical center of the territory from which the Association draws its membership and attendance, so that it can be reached easily from all directions. Given pleasant fall weather in November, many visitors will avail themselves of the good roads and come by auto.

The programs are well up to standard and advance copies will be sent out in the near future. The whole United States is well represented with many names that never have appeared before on the Association's program. New ideas should be plentiful in such an array of talent.

The general sessions and the sessions of the sixteen sections of the Association, together with the sessions of three of the societies meeting conjointly, i. e., the American Society of Tropical Medicine, the National Malaria Committee, and the Southern Branch, Society for Experimental Biology and Medicine, will be held Wednesday, Thursday and Friday, November 16-18, with the other conjoint meeting, the Southern Branch, American Public Health Association, holding forth the two days previous, Monday and Tuesday, November 14-15. A warm welcome is yours.

EPILEPTIFORM AND EPILEPTIC CONVULSIONS FROM HYPERINSULINISM

Hypoglycemia due to the spontaneous excessive secretion of insulin by the islet cells of the pancreas was recognized first by Harris,[1] in 1923; and the condition, or disease entity, resulting from it was given the name of hyperinsulinism. It is, therefore, essentially a disease of the pancreas. The first cases reported were comparatively mild, having symptoms identical with those produced by overdoses of insulin given to diabetics, i. e., weakness, irritability, nervousness, tremors, profuse perspiration, general malaise, drowsiness, prostration, abdominal discomfort, and hunger, the attacks occurring three or four hours after meals and at night, and relieved by a soft drink or food (Harris[2]). In the past eight years many cases of mild hyperinsulinism have been reported in American and European literature, most of which have been controlled by dietary management, including frequent feedings.

EPILEPTIFORM ATTACKS

A number of severe cases of hyperinsulinism have been described by capable and careful clinicians in which the most important hypoglycemic manifestations were recurring attacks of unconsciousness, with and without *grand mal* and *petit mal* seizures. In several of them a diagnosis of epilepsy had been made, but was discarded when marked degrees of insulinogenic hypoglycemia were found. In the case of Jonas,[3] reported also by Hartman,[4] the patient who had recurring attacks of unconsciousness three or four hours after meals (blood sugar 0.030 per cent) was sent to an epileptic institution and there died. The first instance of recurring attacks of convulsions and unconsciousness proven to be due to hyperinsulinism was reported by Allen[5]

1. Harris, Seale: The Etiology and Prevention of Diabetes. Virginia State Med. Ass'n., Oct., 1923. Virginia Med. Monthly, 50:672, Jan., 1924.
2. Harris, Seale: Hyperinsulinism and Dysinsulinism. J.A.M.A., 83:729, 1924.
3. Jonas, L.: Hypoglycemia. M. Clin. N. Amer., 8:949, 1924.
4. Hartman, F. L.: Hypoglycemia. Med. Clin. N. Amer., 12: 1035, 1929.
5. Allen, F. N.: Carcinoma of the Islands of Pancreas with Hyperinsulinism. Proc. Staff Meet., Mayo Clinic, 2:89, 1927.

and Wilder[6] (blood sugar 0.030 per cent). In this case of inoperable carcinoma of the pancreas, autopsy showed that metastatic nodules in the liver contained proliferating islet (insulin-forming) cells. Allan[7] reported two other cases of recurring attacks of convulsions with hypoglycemia due to hyperinsulinism.

Howland, Campbell, Maltby and Robinson[8] (Toronto) were the first to cure convulsions and coma due to dysinsulinism (blood sugar 0.040 per cent) by surgical removal of a small adenoma of the pancreas. Nielson and Eggleston[9] controlled "epileptiform seizures" in three cases of dysinsulinism (blood sugars 0.050, 0.069, 0.064 per cent) by dieting with frequent feedings. Carr, Parker, Grave, Fisher and Larrimore[10] diagnosed an adenoma of the pancreas, operation for which cured the patient, a boy 18 years of age who had recurring attacks of convulsions (blood sugar 0.042 per cent). Weil's[11] case of a young woman who had recurring attacks of convulsions and unconsciousness only during menstruation (blood sugar 0.037 per cent) which had been pronounced epilepsy, was completely relieved by a low carbohydrate and high fat diet, with frequent feedings. McGavern's[12] patient, who had repeated attacks of amnesia and unconsciousness (blood sugar 0.030 per cent) diagnosed in a large clinic as "epileptic equivalent," was completely relieved by dieting. Womach, Gragi and Graham's[13] patient, cured clinically by the removal of a small adenoma of the islet tissue of the pancreas, had hypoglycemic attacks characterized by mental confusion and periods of unconsciousness. At a clinic a diagnosis of probable brain tumor was made. At another clinic his appendix and gall-bladder had been removed. Harris, Taylor, Graham and Chilton[14] recently studied a patient with recurring and prolonged attacks of unconsciousness which could not be controlled by dieting, and in whom death seemed imminent (blood sugar 0.050 per cent), who was relieved by resection of about one-half of the tail and body of the pancreas. For three weeks after operation fasting blood sugar readings averaged 0.100 per cent.

A review by Harris[15] of the reported American cases of hyperinsulinism associated with attacks of unconsciousness, with and without convulsions, shows that five were controlled by dieting; three were cured clinically by removal of adenomata of the pancreas; three were unimproved; and two died. The facts that adenoma of the islet tissue of the pancreas is associated with hyperinsulinism, and its removal relieves the symptoms, suggest the analogy of hyperthyroidism due to toxic adenoma of the thyroid.

Judd, who operated upon Allen's patient,[16] the Finneys, who operated upon Sprunt and Barker's case,[17] and Taylor, who operated upon Harris' patient,[14] resected varying portions of islet tissue of the pancreas, hoping thus to reduce the secretion of insulin. There was only slight improvement in the cases reported by Allen, Judd, et al., and Barker, Sprunt and the Finneys; but in the case reported by Harris, Taylor et al., the symptoms were relieved and fasting blood sugar readings were normal after the operation.

In the six operations upon the pancreas for hyperinsulinism, three for removal of adenomata and three partial resections, there was not a fatality. The excellent results of surgery for the relief of hyperinsulinism presage operations upon the pancreas becoming more frequent; and it is predicted that surgeons in the future will learn from experience to estimate the amount of pancreatic tissue to resect in order to give relief from hyperinsulinism, as they have done in the past in treating hyperthyroidism. Pancreatic surgery will always be difficult and dangerous, and should never be undertaken except by the most skilled surgeons, who can have associated with them clinicians experienced in the dietary management of metabolic diseases.

EPILEPSY ASSOCIATED WITH HYPERINSULINISM

Harris[18] recently reported three typical cases of epilepsy associated with hyperinsulinism. In these the fasting blood sugars were: 0.050, 0.060 and 0.065 per cent; and the glucose tolerance curves in all were typical of hypoglycemia due to hyperinsulinism. There was marked im-

6. Wilder, Allan, Power, and Robertson: Carcinoma of the Islands of the Pancreas, Hyperinsulinism and Hypoglycemia. J.A.M.A., 89:348, 1928.
7. Allan, F. N.: Hyperinsulinism. Proc. Staff Meet., Mayo Clinic, 3:367, 1928.
8. Howland, Campbell, Maltby, and Robinson: Dysinsulinism: Convulsions, Coma Due to Islet Cell Tumor of the Pancreas with Operation and Cure. J.A.M.A., 93:674, 1929.
9. Neilson and Eggleston: Functional Dysinsulinism with Epileptiform Seizures: Treatment. J.A.M.A., 94:860, 1930.
10. Carr, Parker, Grave, Fisher, and Larrimore: Hyperinsulinism From B-Cell Adenoma of the Pancreas. Operation and Cure. J.A.M.A., 96:1363, 1931.
11. Weil, Clarence: Personal communication.
12. McGavern, Bernard E.: Epileptoid Attacks and Hyperinsulinism. Endocrinology, 16:293, May-June, 1932.
13. Womack, N. A.; Gragi, W. B., Jr.; and Graham, E. A.: Adenoma of the Islands of Langerhans: Successful Operative Removal. J.A.M.A., 97:12, 831-836, Sept., 1932.
14. Harris, Seale; Taylor, Adrian S.; Graham, George S.; and Chilton, D. H.: Unreported case.
15. Harris, Seale: Hyperinsulinism and Dysinsulinism. Endocrinology, 16:1, 29-42, Jan., Feb., 1932.
16. Allan, Boeck and Judd: The Surgical Treatment of Hyperinsulinism. J.A.M.A., 94:1116, 1930.
17. Finney and Finney: Resection of the Pancreas. Ann. Surg., 88:584, 1928.
18. Harris, Seale: Epilepsy Associated with Hyperinsulinism: Report of Three Cases. Amer. Ass'n for Study of Int. Secre., May, 1932.

provement from dieting in two patients, while the third, who refused to carry out dietary instructions, was unimproved. Harris does not claim that the spontaneous excessive secretion of insulin is the cause of epilepsy, but suggests that there may be a small group of epileptics in which the hypoglycemia of hyperinsulinism is a factor in the production of the attacks of *petit mal* and *grand mal*. He quotes Lennox and Cobb,[19] whose monograph on epilepsy is said to be the most important recent contribution to the literature upon an unsolved medical problem, as saying that "epilepsy is a symptom rather than a disease entity," and that an "underlying constitutional tendency to convulsions" exists in epileptics, and suggests that perhaps in a small proportion of cases epilepsy may be a symptom of hyperinsulinism.

Hypoglycemia from the hypodermatic use of insulin (induced hyperinsulinism) will produce unconsciousness, and sometimes convulsions, both in lower animals and in human beings. It would seem that the hypoglycemia from the spontaneous excessive secretion of insulin (hyperinsulinism) could cause the recurring attacks of epileptiform convulsions and even epileptic seizures. Banting and Best[20] found in experimenting upon animals with insulin that hypoglycemia, with a blood sugar of about 0.050 per cent, would bring on unconsciousness and convulsions. A few cases have been reported in which overdoses of insulin in diabetics would cause convulsions (Joslin[21] and Woodyatt[22]). Herold's[23] diabetic was cured of "epilepsy" by adjusting the insulin dosage to meet the patient's need. Lennox and Cobb[19] report the case of a diabetic whose first epileptic seizure followed an overdose of insulin. They produced hypoglycemia in this patient, with depression of blood sugar below 0.050 per cent, seven times by giving insulin. Convulsions were brought on twice, but Lennox and Cobb also observed convulsions in this patient when the blood sugar was normal, indicating that there were other factors besides hypoglycemia producing the epileptic seizures.

In the light of recent investigations it would seem advisable at least to make fasting blood sugar studies and glucose tolerance tests in all cases of recurring attacks of convulsions and unconsciousness, whether epileptic or not, in which the cause of the attacks has not been determined. Blood sugar studies on large groups of epileptics may result in some of them being relieved of the stigma of epilepsy by being classified as having a disease of the pancreas, hyperinsulinism. In such cases there is hope of relief by dietary management; and if that fails, surgery may be resorted to in competent hands with about the same degree of safety as in gall-bladder operations and with results in relieving the convulsions of hyperinsulinism perhaps as good as in operations upon severe cases of hyperthyroidism.

19. Lennox, William G.: and Cobb, Stanley: Epilepsy. Medicine, 8:105-291. Williams & Wilkins Co., Baltimore, 1928.
20. Banting and Best: Internal Secretions of Pancreas. Jour. Lab. & Clin. Med., 7:251, 1922.
21. Joslin, E. P.: Treatment of Diabetes Mellitus, p. 45. Lea & Febiger, Phil., 1928.
22. Woodyatt, R. I.: Jour. Metab. Res., 1922, 2,793. Joslin, E. P. Loc.
23. Herold, A. A.: Unreported case. Personal communication.

GLEANINGS FROM THE LAY PRESS

Coolidge's Hay-Fever.—It is not strange that, in recent decades our president with the least sense of humor, Coolidge, should have furnished the two choicest bits of amusement. His not choosing to run and his refusal to be present at Hoover's speech-of-acceptance party, both gave the whole country a big laugh, and the cartoonists and columnists something to play up.

The attention of non-sufferers from hay-fever over the whole country has been directed to hay-fever by Calvin Coolidge's refusal to attend Hoover's speech-of-acceptance gathering in Washington, August 11, on the grounds that he is a victim of that disease. Those so affected need no reminder. Will Rogers, ever a warm champion of the Democratic party, has seized upon the incident and has created mirth at the same time that he has cast doubt upon an ex-president's veracity.

As a matter of fact, hay-fever is by no means an uncommon complaint. Thousands of people in America are victims of the disease, a condition whose occasional mild outward form at least might easily escape the notice of casual lay acquaintances. Especially is this true of the sphinx-like Coolidge, noted as he is for keeping his own counsel.

Light pollens that are easily carried by the winds are the chief offenders. Of these at this very season many plants are furnishing pollen in the region of Washington, and in much of the country that would have been traversed by Mr. Coolidge from Vermont to Washington, D. C.

An attack of hay-fever, we were about to say, is nothing to be sneezed at. It is certainly a very distressing affliction, as many sufferers can testify. The symptoms bring nothing but grief and discomfort to the patient, who, in a well marked case, would go to great lengths to avoid a recurrence of his malady. Many Southerners

seek the Northern United States and Canada in the summer just to escape hay-fever. Who knows that poor Coolidge did not choose to run because he did not care to have his nose and eyes run for another four summers in Washington?

While most of the Southern readers have never been political supporters of Coolidge and may even look upon his rise to the presidency of the United States as a mere stroke of chance and good fortune, as medical men doubtless we shall be much more sympathetic with him even than his Republican brethren of the North until it is shown that he has never had hay-fever.

Fee-Splitting.—The fight upon fee-splitting, so valiantly waged by the American College of Surgeons, has resulted in a marked diminution of that type of dishonesty. At least one State (Alabama) makes it a penitentiary offense. But with all the organized effort of the medical men to stamp out this dishonest practice, it is doubtful that anything like the publicity has ever been gained for the anti-fee-splitting movement that has been attained by front page newspaper accounts of Mayor Jimmie Walker's brother's admission that he split fees with the four physicians employed by the City of New York to do its accident surgery.

The Associated Press states:

"The Grievance Committee of the State Board of Medical Examiners has taken under advisement charges of fee-splitting against five doctors, including Dr. William H. Walker, brother of the Mayor.

"The charges were preferred by Paul Blanshard, head of the City Affairs Committee, a citizens' group, and a preliminary hearing was held Wednesday to determine if they warrant a trial.

"The Committee ruled that to constitute grounds for action, the facts must establish fraud or deceit. Fee-splitting cannot be considered prima facie evidence of fraud, it said."

It will be recalled that in Mayor Walker's trial before Governor Franklin D. Roosevelt he publicly stated that he (the Mayor) saw no harm in fee-splitting and that he did it in his own law practice. An enlightened laity will prove invaluable in stamping out this evil and will result in more states' putting it under the ban.

"Prostate" Brinkley.—Those who have experienced the displeasure of having some of their favorite radio programs drowned out by a station operated through remote control by a blatant quack of Milford, Kansas, may be interested in this excerpt from the *Baltimore Sun:*

"'Doc' Brinkley has turned on his old radio in Kansas and again threatens to be a thorn in the side of the two major parties. He is the goat-gland specialist who set Kansas afire two years ago. Then, with the farmers well heated up, the 'Doc' polled 183,000 votes for governor in an election in which his name had to be written onto the ballots. His license to practice medicine was revoked on the ground of 'unprofessional conduct and gross immorality,' but Kansas seems sold on goat-glands, and 'Doc' is working the martyr racket until he has 'em crying out loud.

"In the business of promising he has the world beaten, his platform being one that greases everybody. He is piety personified, and that goes even among the wet-drinking Kansas drys. The State has never witnessed more praying, and one astounded, hard-boiled regular says 'the "Doc" could grow whiskers and make the folks believe he was John the Baptist.' When they see him attract the greatest crowds ever gathered at a political meeting in the State and recall what happened two years ago, the concern of the old-line politicians is understandable.

"A visiting correspondent says that what makes the 'Doc' dangerous is that the State is 'cold on Hoover, but not so hot on Roosevelt.' What it wishes most to do is to 'whale the Farm Board.' If one is puzzled to know how voting for a goat-gland doctor would serve to rebuke the Farm Board, he should know that when Kansas runs amuck it forgets logic and goes the whole route."

It has been suggested that Brinkley may have become acquainted with the prostate gland in preparing for his state board examinations and that he has never seemed to get very far beyond his friend Goepp.

Correspondence

THE FEMALE URETHRA

A NEW FACTOR IN THE INFECTIONS OF THE KIDNEY PELVIS IN WOMEN AND CHILDREN

Dallas, Texas, August 2, 1932.

Editor, SOUTHERN MEDICAL JOURNAL:

Imagine my surprise at finding in your issue of August an article by me on "The Female Ureter" instead of "The Female Urethra" as it should have been.

It is of course too late now to make any correction, but be sure that the title is corrected in the reprint.

Sincerely yours,
(Signed) A. I. FOLSOM.

EDITOR'S NOTE.—As originally set up and according to the proof seen by Dr. Folsom and the Editorial Department, the title was correct, "The Female Urethra." The addition of the star referring to the foot notes, omitted in the original set up, necessitated the printer's resetting the title line, and in so doing he made the mistake, making the title read "The Female Ureter." The regular proof readers handling the page proofs, not seen by Dr. Folsom or the Editorial Department, failed to note the error. The JOURNAL regrets any mistakes that go unnoticed and uncorrected in the JOURNAL, but particularly does it regret an error in so important a part of any paper as its title.

Book Reviews

Behavior Aspects of Child Conduct. By Esther Loring Richards, B.A., M.D., D.Sc., Associate Professor of Psychiatry, Johns Hopkins School of Medicine; Physician-in-Charge of Dispensary, Henry Phipps Psychiatric Clinic, Johns Hopkins Hospital. With a foreword by Adolf Meyer. New York: The Macmillan Company, 1932. Cloth, $2.50.

Dr. Richards has selected a subject of interest to laymen as well as physicians. She has expressed her thoughts in language simple enough for everyone. Three important points are stressed:

(1) Mind is not some vague part of the human organism, but the individual in action.

(2) The aim of parents, teachers, physicians, social workers and clergymen should be to interpret behavior rather than to judge conduct.

(3) The interpretation of behavior involves careful and systematic attention to such practical matters as individual intellectual ability, physical status, habit training, social and economic conditions, opportunities for play and social contacts, and constitutional endowment of emotional control.

In the chapter on the adolescent Dr. Richards warns of the futility of trying to plan the future for your child.

This book is worthy of consideration by anyone who comes in close contact with children.

Southern Medical News

ALABAMA

The Houston County Medical Society held a picnic meeting in July, at which time Dr. J. N. Baker, Montgomery, State Health Officer, was the chief speaker.

Dr. W. S. McElrath, Cedar Bluff, is a newly appointed member of the Court of County Commissioners of Cherokee County.

Dr. R. R. Bridges, Scottsboro, has moved into new offices in the new Rosson Building.

Dr. B. C. Garrett, Shreveport, Louisiana, a native Alabamian, his boyhood home being in Clark County, won the first prize in the annual fishing rodeo held the early part of August in Mobile Bay. Dr. Garrett landing the largest fish caught during the rodeo.

Deaths

Dr. Hugh Boyd, Scottsboro, aged 52, died suddenly August 6 while making an address.

Dr. Stonewall Jackson Gay, Lineville, aged 69, died May 23 of heart disease.

ARKANSAS

The Ashley County Medical Society met jointly with Chicot, Desha, Drew Counties and Morehouse Parish, Louisiana, in June, when they held their annual fish dinner and scientific program.

Dr. M. D. Duncan, Mountain Pine, has moved to Murfreesboro to practice.

Dr. L. N. Bollmeier has moved from Mountain Pine to Hot Springs to practice.

Deaths

Dr. Everett L. Sullivan, Poughkeepsie, aged 51, died suddenly June 11 of cerebral hemorrhage.

Dr. Isaac N. Freeman, Hot Springs, aged 65, died June 20.

Dr. Henry Harrison Atkinson, Fordyce, aged 52, died June 6.

Dr. Noble Robert Townsend, Arkadelphia, aged 65, died June 24.

Dr. George W. Scruggs, Humnoke, aged 63, died June 21.

DISTRICT OF COLUMBIA

Dr. Daniel L. Borden, Washington, was elected President of the Alumni Association of George Washington University at a recent meeting, and Dr. Frederick A. Reuter, Washington, was elected Vice-President, representing the School of Medicine.

George Washington University Medical School has recently had completed a new medical laboratory building to be used for teaching and research.

Dr. Rolla E. Dyer, Washington, U. S. Public Health Service, in recognition of his recent work on endemic typhus fever, was awarded the degree of Doctor of Laws by Kenyon College, Gambier, Ohio, in June.

Dr. Mary O'Malley, Washington, was elected President-Elect of the Medical Women's National Association, which met in New Orleans in connection with the meeting of the American Medical Association.

Deaths

Dr. Hiram W. Austin, Washington, Senior Surgeon, U. S. Public Health Service, retired, aged 82, died June 20.

Dr. Thomas Collins Stevenson Marshal, Washington, aged 76, died June 29.

FLORIDA

The Florida Public Health Association has received notice of its recognition by the American Public Health Association as an affiliated society.

Dr. T. H. D. Griffitts, Surgeon, United States Public Health Service, has been transferred to duty at Jacksonville.

Dr. Frank C. Metzger has moved from Sarasota to Tampa to locate.

The Duval County Tuberculosis Association and Hope Haven Association, Inc., held a joint annual meeting recently.

Dr. Carl Williams, St. Petersburg, was recently elected President of the State Board of Medical Examiners to succeed Dr. Thomas W. Hutson, Miami; Dr. J. D. Raburn, Trenton, was elected Vice-President; and Dr. W. M. Rowlett, Tampa, was elected Secretary-Treasurer.

Dr. J. E. Rawlings, Daytona Beach, recently attended the annual reunion of the Spanish War Veterans at Hollywood, representing General Lawton Camp 15. Dr. Rawlings was elected Department Surgeon for the Florida S. A. W. V.

Dr. Charles L. Park, Sanford, was recently made a member of the staff of physicians and surgeons of the Sanford Clinic.

Dr. O. O. Feaster, St. Petersburg, has moved into new offices at the St. Anthony's Hospital.

The Staff of the Orange General Hospital, Orlando, at its recent annual meeting, elected the following officers for the ensuing year: Dr. William H. Spiers, President; Dr. J. R. Chappell, Vice-President; and Dr. Humphrey Gwynn, Secretary-Treasurer; all of Orlando.

Dr. T. F. Jackson, Dade City, was elected President of the Emory Alumni Association in June while he was attending the clinic of Emory University Medical School, Atlanta.

Dr. E. C. Aurin, Arcadia, has been elected County Commissioner of the Fifth District.

Dr. J. J. Saxton, Tampa, has been appointed Assistant City Health Officer.

Dr. Hugh West, DeLand, is spending the summer in Vienna, where he is taking special work in general surgery and gynecology.

Dr. William S. Nichols, Lake City, and Miss Marie Eleanor Haile were married June 28.

Dr. Homer King Vann, Leesburg, and Miss Mary Beall Bridges were married July 2.

Deaths

Dr. George S. Stone, Fort Myers, aged 64, died June 1.

Dr. Charles Walker Mangus, Homestead, aged 72, died May 17 of pernicious anemia.

Dr. M. Jackson Anderson, Tampa, aged 70, died May 7 of ruptured appendix and carbuncle.

Dr. Wilmer Cortez Box, Graceville, aged 48, died June 12.

Dr. John S. Helms, Sr., Tampa, aged 61, died July 23.

GEORGIA

Dr. Hugh McCulloch, Sr., West Point, has been elected President of the Chattahoochee Valley Free Medical Clinic, which was formally opened in July to be operated solely for the benefit of people who are not able to pay for medical treatment.

Dr. Murdock Equen, Atlanta, was recently elected to Fellowship in the American Bronchoscopic Society.

Dr. Ford Ware has returned to his former home, Americus, where he has opened offices for the practice of medicine.

Dr. Henry W. Clements, Adel, was host recently to the physicians of Berrien, Cook and Lowndes Counties, when a barbecue was enjoyed and subjects of vital interest to the profession were discussed.

Dr. C. L. Ridley, Macon, is the newly elected Chairman of the Advisory Committee to the Georgia Department of Public Health, other members of the Committee being Dr. J. A. Redfearn, Albany; Dr. H. L. Erwin, Dalton; Dr. William H. Myers, Savannah; and Dr. Marvin M. Head, Zebulon.

Dr. Murdock Equen, Atlanta, announces the association of Dr. Stacy C. Howell in the practice of otology, laryngology and rhinology.

Dr. Grady E. Clay, Atlanta, announces the association with him in his offices of Dr. J. Mason Baird, formerly of Wills Hospital, Philadelphia.

Dr. Charles E. Hall, Jr., and Miss Virginia Manston, both of Atlanta, were married June 20.

Dr. Edward Berkeley Neal, Douglas, and Miss Ethel Dickerson were married May 28.

Deaths

Dr. William A. Drane, Buena Vista, aged 71, died June 6 of typhoid fever.

KENTUCKY

Dr. William A. Quinn, Henderson, has been appointed to succeed Dr. James E. Fox as Superintendent of the Central State Hospital for the Insane at Lakeland.

Dr. Elijah H. Maggard, Owingsville, formerly Health Officer of Bath County, has been appointed to succeed Dr. Fred G. Larue as Superintendent of the Eastern State Hospital at Lexington.

Dr. Samuel G. Dabney, Louisville, was recently honored by members of the Louisville Medico-Chirurgical Society with a dinner felicitating him upon the completion of fifty years in the practice of medicine.

Dr. A. T. McCormack, Louisville, State Health Officer, announces that an eight months' course in laboratory technic will be given by the State Board of Health, beginning in September.

The Kenton-Campbell County Medical Society had as their guest speaker at a recent meeting Dr. Carl A. Wilzback, Cincinnati, Ohio.

Deaths

Dr. Thomas H. Bedford, Meshack, aged 86, died April 1 of chronic myocarditis.

Dr. Omar Hollinger Shively, Campbellsville, aged 60, died May 28.

Dr. Charles Randolph Hunter, Sandy Hook, aged 40, died June 3.

Dr. James Allen Prichard, Buchanan, aged 64, died June 10.

Dr. Robert N. Whitehead, Fulton, aged 71, died June 10.

Dr. Noah B. Chipman, Falmouth, aged 79, died June 26 of angina pectoris.

LOUISIANA

Dr. Isaac I. Lemann, New Orleans, was an instructor this summer in a graduate course given in a circuit of six Oklahoma cities.

Dr. B. C. Garrett, Shreveport, won first prize in the annual fishing rodeo off Dauphin Island in Mobile (Alabama) Bay early in August, Dr. Garrett landing the largest fish caught during the rodeo.

Dr. J. H. Musser, New Orleans, has been appointed by the Board of Trustees of the American Medical Association as one of the five members of the Editorial Board of Archives of Internal Medicine.

Dr. Urban Maes, New Orleans, has accepted the Chair of Surgery in the new Louisiana State University Medical Center.

The Sixth District Medical Society held its annual session in Baton Rouge in July and elected the following officers for the coming year: Dr. Lester J. Williams, Baton Rouge, President; Dr. Sidney Porter, East Baton Rouge, Dr. Clovis Toler, East Feliciana, Dr. Guy A. Darcantel, Iberville, Dr. M. Williams, Livingston, Dr. J. H. McClendon, Tangipahoe, Dr. M. O. Becnel, Pointe Coupee, Dr. H. A. Tynes, St. Helena, Dr. H. C. Gautreau, St. Tammany, Dr. E. E. Lafferty, Washington, Dr. Paul Landry, West Baton Rouge, Dr. C. C. Blakeney, West Feliciana, Vice-Presidents; and Dr. Cecil Lorio, Baton Rouge, Secretary.

Riverside Sanitarium, Monroe, has reopened with Miss Nobie May Smith in charge.

Deaths

Dr. Addley Hogan Gladden, Monroe, aged 66, died June 8 of chronic nephritis.

Dr. George Stromer, Broussard, aged 71, died May 8 of pneumonia.

Dr. Paul J. Gelpi, New Orleans, aged 58, died July 19.

Dr. R. P. Jones, Baton Rouge, aged 60, died May 23.

Dr. Sylvain DeNux, Marksville, aged 53, died July 5.

Dr. Joseph D. Tuten, Lake Charles, died recently.

MARYLAND

The Johns Hopkins University, Baltimore, announces a Bone and Radiological Conference to be held September 19-24 under the auspices of the Surgical Pathological Laboratory of the Johns Hopkins Hospital.

Physicians of Worcester County have offered to cooperate with the County Medical Society by examining children whose parents are not able to pay for medical service. Dr. Bradford Massey, Pocomoke City, County Health Officer, is chairman of a special committee to arrange a schedule of appointments for the examinations.

Dr. Albertus Cotton, Baltimore, Professor of Orthopedic Surgery and Roentgenology, University of Maryland School of Medicine, and College of Physicians and Surgeons, recently conducted crippled children's clinics at Salisbury and Snow Hill for the Maryland League for Children. Clinics will also be held at Chestertown and in Charles and St. Mary's Counties.

Johns Hopkins Hospital is asking the supervisors of city charities for an increase of $50,000 in its annual appropriations to help them meet the increased demand made upon the Hospital.

Dr. Fielding Hudson Garrison, Baltimore, Librarian of the William H. Welch Library, Johns Hopkins University School of Medicine, recently was awarded the degree of Doctor of Literature by Yale University.

Dr. Joseph P. Franklin and Miss Jean Arendes, both of Cumberland, were married July 5.

Dr. Richard C. Dodson, Rising Sun, and Miss Annie Caddall were married June 30.

Dr. Egbert L. Mortimer and Miss Caroline Bushnell Lucius, both of Baltimore, were married June 18.

Dr. John Harlan Hornbaker, Baltimore, and Miss Elizabeth Gilbert Chaffinch were married June 23.

Deaths

Dr. William Broaddus Pritchard, Princess Anne, aged 69, died suddenly June 6.

MISSISSIPPI

Members of Pike County Medical Society have been attending a series of lectures by visiting physicians, these lectures being a part of the Society's program for 1932 which provides for at least eight lectures and clinical days during the year.

Dr. Taswell Paul Haney, Jr., Lexington, has been elected Secretary of the Pike County Medical Society.

Dr. C. M. Speck, New Albany, was recently appointed hospital inspector for the Northern District of the State.

Dr. W. E. Aiken, Vicksburg, is located temporarily in Louisville, Kentucky, where he is taking postgraduate work and serving as resident physician at St. Joseph Infirmary.

Dr. Thomas P. Sparks, Jackson, has moved to Vicksburg and is located at the Vicksburg Clinic and Hospital.

Dr. G. S. Bryon has moved from New Hebron to Oak Vale.

Dr. D. V. Galloway, Clarksdale, who for the past year has been studying at Harvard Medical School, has obtained a Certificate in Public Health.

Dr. A. J. Ware, Meridian, formerly County Health Officer of Washington County, and Superintendent of the Mattie Hersee Hospital, Meridian, has returned to Greenville, where he will be located on his plantation.

Dr. Hugh McCalip, Yazoo City, and Dr. Rosa May, Brookhaven, have received Certificates in Public Health after studying at Johns Hopkins.

Dr. W. W. Hall, Jr., and Miss Louise Wilkinson, both of Shelby, were married in June.

Dr. George S. Daly, Columbia, and Miss Eugenia Railsback were married May 21.

Deaths

Dr. J. M. Dampeer, Crystal Springs, aged 65, died July 14.

Dr. M. C. Armstrong, Jayess, aged 50, died June 25.

Dr. W. D. Beacham, Hattiesburg, died in June.

Dr. N. H. Buie, Fayette, aged 66, died in June.

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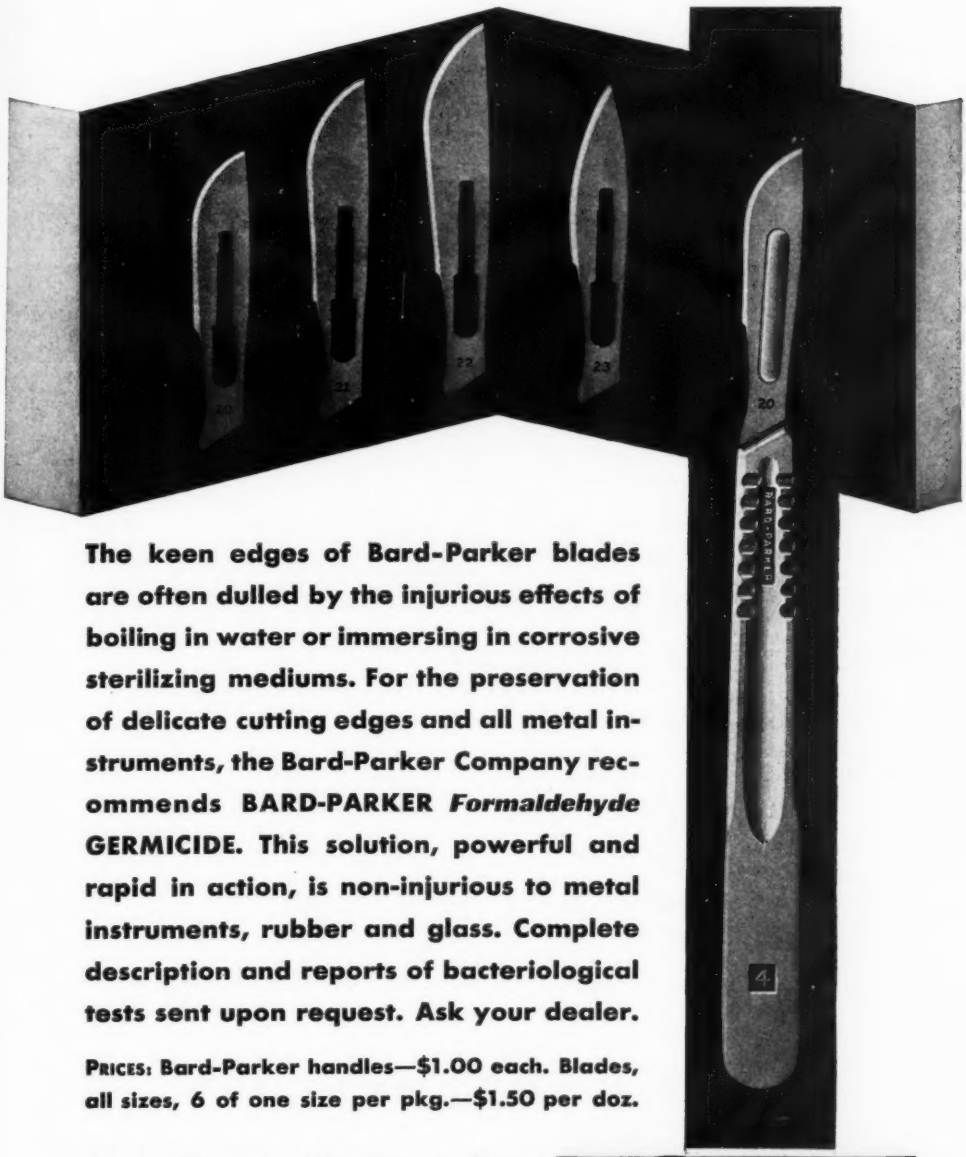

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LOUISVILLE, KENTUCKY

Continued from page 1004

MISSOURI

On August 17 the city and county of St. Louis observed Tuberculosis Day, when everyone was asked to assist the Tuberculosis and Health Society in its campaign for funds to carry on its health work in combating this disease.

Dr. Millard F. Arbuckle, St. Louis, was the guest speaker at a recent meeting of the Vanderburgh County Medical Society, Indiana.

The Kansas City Southwest Clinical Society announces its fall meeting for October 3 to 8, with headquarters at the Hotel President in Kansas City.

Dr. Elsworth S. Smith, St. Louis, recently made a lecture and clinic tour through Oklahoma under the auspices of the University of Oklahoma School of Medicine.

Dr. John O'Connell, Overland, Coroner of St. Louis County, was host recently to members of the St. Louis County Medical Society when he entertained at his country home.

The Central States Pediatric Society, under the Presidency of Dr. Frank C. Neff, Kansas City, will meet in Kansas City October 7 and 8.

Dr. Garold V. Stryker, St. Louis, was a guest speaker recently at a meeting of the Effingham County Medical Society, Illinois.

Dr. Elmer B. M. Casey and Miss Theresa Jean Migel, both of St. Louis, were married recently.

DEATHS

Dr. Gustavus Adolphus Gissy, St. Louis, aged 65, died June 3 of heart disease.

Dr. Chambers B. Clapp, Moberly, aged 73, died June 12 in a hospital at West Palm Beach, Florida.

Dr. William Marcy Hindman, Burlington Junction, aged 48, died June 26 of a tumor of the lung.

Dr. Frank P. Johnson, St. Louis, aged 81, died July 19 of heart disease.

Dr. Cornelius C. VanderBeck, St. Louis, aged 79, died June 15 of cerebral hemorrhage.

NORTH CAROLINA

Dr. Wingate Johnson, Winston-Salem, recently made the principal address at the graduation exercises of the Wesley Long Hospital Training School for Nurses at Greensboro.

Dr. L. B. McBrayer, Southern Pines, Secretary-Treasurer of the North Carolina Medical Society, recently addressed a joint meeting of the Rutherford County Club and the Rutherford County Medical Association.

The State Medical Society at a recent meeting appointed the following new members of the State Board of Medical Examiners: Dr. Kirby G. Averitt, Fayetteville, President for one year; Dr. James W. Vernon, Morganton, Dr. William H. Smith, Goldsboro, Dr. Hamilton W. McKay, Charlotte, Dr. Benjamin F. Royal, Morehead City, Dr. Franklin Webb Griffith, Asheville, and Dr. Benjamin J. Lawrence, Raleigh, elected Secretary for six years.

The Second District Medical Society met in Morehead City recently and elected the following officers for the coming year: Dr. J. S. Rhodes, Williamston, President; and Dr. J. E. Smithwick, Jamesville, Secretary.

Dr. Leroy J. Butler, Winston-Salem, has been directing the work

Continued on page 28

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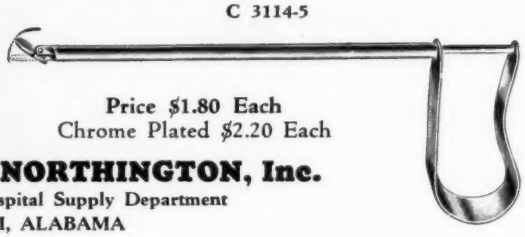

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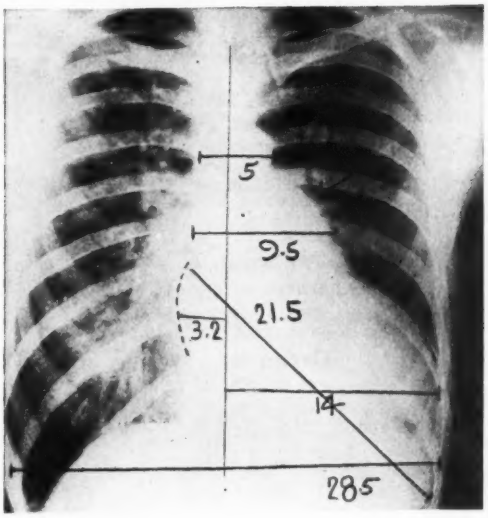

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Continued from page 26

this summer of the Roaring Gap Children's Hospital, which opened in June.

The following physicians have been elected officers of the Staff of St. Leo's Hospital, Greensboro: Dr. Marion Y. Keith, President; Dr. C. R. Reaves, Vice-President; and Dr. W. L. Patman, Secretary-Treasurer, all of Greensboro.

Dr. George H. Kirby, Goldsboro, has been elected Vice-President of the American Psychiatric Association.

The staff of the Nalle Clinic announces the association of Dr. James Robert Adams, who has recently completed a course in pediatrics under Dr. McKim Marriott of St. Louis.

Dr. Harold Benjamin Smith, North Wilkesboro, and Miss Mary McLeod were married in June.

Dr. Augustus Steele Rose, Fayetteville, and Miss Grace Duncan were married June 24.

Dr. Franklin McLean Grady, Clinton, and Miss Lydia Percival were married June 29.

Dr. Julian Deryl Hart, Durham, Professor of Surgery at Duke University, and Miss Mary Elizabeth Johnson were married June 18.

Dr. Joseph B. Westmoreland, Canton, and Miss Margaret Fleming were married recently.

Dr. Robert G. Tyndall, Kinston, and Miss Margaret Lorena Helms were married June 18.

Deaths

Dr. Samuel B. Medford, Clyde, aged 68, died June 4 as the result of an automobile accident.

Dr. C. L. Scott, Sanford, aged 59, died July 26 of sarcoma of the spine.

Dr. John F. Maxwell, Seven Springs, aged 84, died July 16.

Dr. John I. Davis, Oteen, aged 65, died July 5.

Dr. L. C. McIntosh, Henderson, aged 59, died July 14.

OKLAHOMA

Dr. L. J. Moorman, Oklahoma City, Dean of the University of Oklahoma School of Medicine, is the newly elected Vice-President of the National Tuberculosis Association.

Continued on page 30

ORGANOTHERAPY

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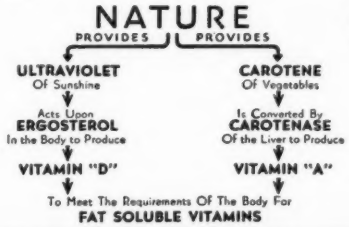

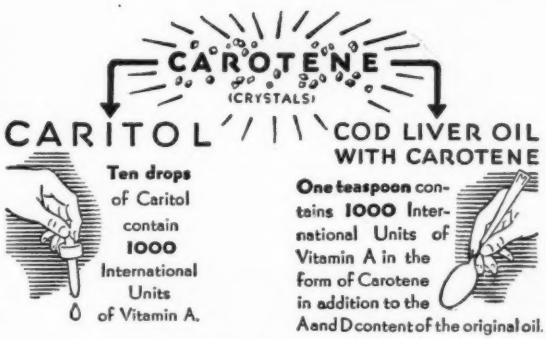

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Continued from page 28

Dr. B. B. Coker, Durant, was host to the Bryan County Medical Society at a picnic supper at his home.

Garfield County Medical Society were guests at a dinner given by the staff members of the Baptist Hospital at Enid. Following the dinner several papers on medical and surgical matters were presented.

Dr. Joseph T. Martin, Dr. Arthur W. White, Dr. Harry Wilkins, Dr. Thomas C. Lowry and Dr. Arthur B. Chase, all of Oklahoma City, were instructors in a recent four weeks' graduate course being held in a series of six Oklahoma cities.

L. B. McWilliams is now serving as Superintendent of the Holdenville Hospital, Inc.

Dr. F. E. Warterfield, Muskogee, has been elected to fellowship in the American Urological Association.

DEATHS

Dr. Herbert Victor Louis Sapper, Oklahoma City, aged 44, died June 3 of cerebral hemorrhage and heart disease.

SOUTH CAROLINA

The Anderson County Medical Society recently entertained at a banquet at which Dr. James R. Young, Anderson, President of the South Carolina Medical Association, and Mrs. Frank P. Wrenn, Anderson, President of the State Women's Auxiliary, were guests of honor.

Dr. John H. Crooks, formerly of Atlanta, Georgia, is the newly appointed Health Officer of Lexington County.

Dr. Martin B. Woodward, Lexington, formerly Health Officer of Lexington County, has been appointed to succeed Dr. William G. Bodie, resigned, as Health Officer of Aiken County.

Dr. Hugh B. Senn, formerly of Beaufort, has been appointed Health Officer of Newberry County to succeed Dr. Henry G. Callison.

The Ridge Medical Society met recently in the Dixie Highway Hotel, Edgefield, where they enjoyed a supper and a scientific program.

Dr. Robert E. Abell, Chester, is the newly elected President-Elect of the South Carolina Medical Association.

DEATHS

Dr. Henry Fleetwood Hoover, Columbia, aged 56, died June 4 in a hospital in Columbia.

TENNESSEE

The West Tennessee Medical Association has elected the following officers for the coming year: Dr. W. Oscar Baird, Henderson, President; Dr. H. G. Edmondson, Martin, First Vice-President; Dr. R. C. Newkirk, Tiptonville, Second Vice-President; Dr. A. I. McSwain, Paris, Secretary; and Dr. George McSwain, Paris, Assistant Secretary.

The Upper Cumberland Medical Society held its thirty-eighth annual session June 16 and 17 at Cookeville.

Dr. K. A. Bryant and Dr. A. M. Gamble, Maryville, have become associated in their practice, limiting their work to eye, ear, nose and throat.

Dr. James B. McElroy, Memphis, was an instructor this summer in a graduate course given in a circuit of six Oklahoma cities by the University of Oklahoma School of Medicine.

Dr. James V. Hughes has opened offices in Savannah.

Dr. John Hardy, Nashville, has been appointed surgeon in charge of the newly rebuilt Emerald-Hodgson Hospital at Sewanee, which has just been completed and opened for occupation.

Tennessee physicians taking postgraduate work at Vanderbilt University Medical School this summer are: Dr. R. C. Gaw, Gainesboro, Dr. G. D. Lequire, Maryville, Dr. M. L. Shelby, Clarksville, and Dr. John Ogle, Sevierville.

Mrs. Alton Keathley is the newly appointed dietitian of the Methodist Hospital, Memphis.

DEATHS

Dr. Joseph L. Rose, Jellico, aged 78, died June 14 of uremia following a prostatectomy.

Dr. E. M. Sanders, Nashville, aged 57, died June 30.

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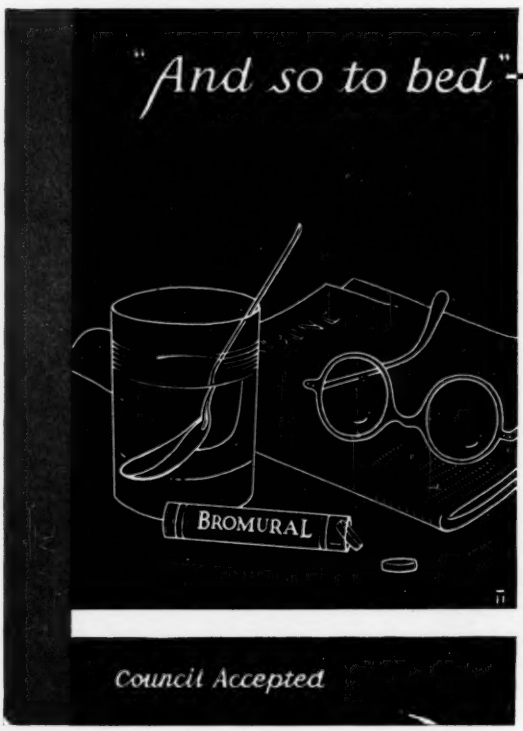

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Continued from page 30

TEXAS

Dr. John O. McReynolds, Dallas, has donated to the University of Texas School of Medicine an extensive ophthalmologic exhibit, consisting of a valuable collection of photographs and specimens.

Dr. E. H. Cary, Dallas, addressed a luncheon given to visiting delegates to the Texas Tuberculosis Association meeting at Fort Worth in June.

The Texas Tuberculosis Association at its meeting in Fort Worth June 3 elected the following officers for the coming year: Dr. John Potts, Fort Worth, President; Dr. R. B. Homan, El Paso, and Mrs. G. T. Vinyard, Amarillo, Vice-Presidents; H. A. Wroe. Austin, Treasurer.

Dr. J. A. Simpson, Laredo, has received the medal of the Order of the Purple Heart for wounds received in the World War.

Dr. Edward H. Cary, Dallas, made the commencement address at the graduating exercises of the Sealy Hospital School of Nursing at Santa Anna in June.

Dr. A. A. Ross, Lockhart, President-Elect of the State Medical Association, was guest of honor at a dinner given by the Caldwell County Medical Society in connection with their regular meeting.

Dr. Curtis Rosser, Dallas, was elected President of the American Proctologic Society, having previously served as Secretary-Treasurer of the Association for three years.

The Dallas Academy of Ophthalmology and Otolaryngology at its meeting in June elected the following officers for the coming year: Dr. O. M. Marchman, Dallas, President; Dr. M. L. Martin, Denton, Vice-President; Dr. W. M. Knowles, Dallas, Recording Secretary; and Dr. J. M. Potts, Dallas, Corresponding Secretary.

Dr. C. W. Stevenson, Wichita Falls, has been appointed a member of the Wichita General Hospital Board.

Dr. T. B. Bass, Abilene, is the newly elected Secretary of the Section on Epilepsy and Convulsions of the American Psychiatric Association.

Dr. John O. McReynolds, Dallas, delivered the commencement address before the graduating class of the King's Daughters School of Nursing at Temple.

E. M. Collier, Superintendent of the West Texas Baptist Sanitarium at Abilene, has been elected President of the Northwest Texas Clinic and Hospital Managers' Association.

Jean Longbridge has been made Superintendent of the Bivings and Barcus Hospital at Big Spring.

Dr. Glenn R. Walker, Mobeetie, and Miss Elise Stiles were married May 5.

DEATHS

Dr. Donald McKay, Flatonia, aged 66, died June 20 of angina pectoris.

Dr. Daniel Cessna De Walt, Houston, aged 43, died May 19 in a local hospital.

Dr. Benjamin Franklin Houston, Corsicana, aged 79, died May 26.

Dr. G. B. Wood, Burke, aged 72, died May 12 of atrophy of the liver.

Dr. Zachary Newton Thornton, Forreston, aged 61, died March 16.

VIRGINIA

Dr. Irl C. Riggin, formerly Executive Director of the American Heart Association, is the newly appointed Director of County Health Work in Virginia, succeeding Dr. Harry G. Grant, resigned.

The Medical Society of Virginia is planning new circuits for additional courses in prenatal care to be given during the fall and winter months. Centers chosen for these courses are selected subject to the approval of the local medical societies.

The second postgraduate clinic for negro physicians at the Medical College of Virginia was held the early part of the summer at St. Philip Hospital.

Dr. F. Waring Lewis, Richmond, has opened offices in the Professional Building and will limit his practice to diseases of infants and children.

Dr. H. I. Amory has located in Phoebus, where he will do general practice.

Dr. C. H. Armentrout has opened offices at Flint Hill, where he will do general practice.

Dr. Calvin H. Cain has located at Orange for the practice of general medicine.

Continued on page 34

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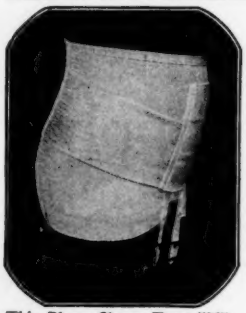

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Continued from page 32

Dr. Wyatt E. Roye has located in Richmond, where he will do general practice.

Dr. Antonio Gentile has become a member of the Staff of the Elizabeth Buxton Hospital, Newport News, where he will practice surgery and gynecology.

The Covington General Hospital has recently undergone alteration and enlargement and is opened now with Dr. W. Preston Burton, Boissevain, in charge.

Dr. J. B. James, Danville, has received an appointment as intern for one year at the American Hospital of Paris.

Dr. Harloe Bailey, Saltville, has completed his internship at the Iowa Methodist Hospital, Des Moines, and has returned home.

Dr. Eugene L. Kellum, formerly of the Mayo Clinic, has become a member of the Staff of Grace Hospital, Richmond, where he will be in the Department of Internal Medicine.

The Northampton County Medical Society held its quarterly meeting at Eastville on July 6.

Dr. Edgard W. Young, Petersburg, has received the Purple Heart Medal for wounds received in the World War.

The Richmond Academy of Medicine will hold the official opening of its new building on September 20.

Dr. Frederick Pilcher, Jr., who has been serving an appointment at the University Hospital, has completed this appointment and has sailed for Vienna for further study.

E. Heath has been appointed Superintendent of the Northampton Accomac Memorial Hospital at Nassawadox.

Dr. Frederick Lionel Finch and Miss Melba Mayhew Gravely, both of Richmond, were married June 23.

Dr. Delbert T. Saffer, Aldie, and Miss Martha Garnett Gresham were married May 15.

Dr. Thomas Meredith Winn, Covington, and Miss Violet Gary were married June 30.

Dr. Franklin McLean Grady, Clinton, and Miss Lydia Percival were married June 29.

Dr. Roshier W. Miller and Mrs. Sallie Knight Hill, both of Richmond, were married July 6.

Dr. Hugh B. Brown, Jr., Abingdon, and Miss Mary Evelyn Jones were married in the spring.

Deaths

Dr. Ceasar S. Bassett, Hampton, aged 54, died May 24.
Dr. William Jackson Smith, Sperryville, aged 70, died May 1.
Dr. Edwin Murray Mann, Kenbridge, aged 64, died July 2.
Dr. Edmund Dozier Hunter, Norfolk, aged 60, died June 30.

WEST VIRGINIA

The West Virginia State Medical Association held its annual session in Parkersburg in June and elected the following officers for the coming year: Dr. D. A. MacGregor, Wheeling, President; Dr. James McClung, Richwood, Dr. T. L. Harris, Parkersburg, Vice-Presidents; and Mr. Joe W. Savage, Charleston, reelected Executive Secretary.

Th Mercer County Medical Society at a recent meeting had as the feature of the program a Symposium on Obstetrics, with Dr. Harry G. Steele, Bluefield, Dr. Evans M. Tanner, Bluefield, and Dr. John I. Markell, Princeton, as the speakers.

Dr. James R. Bloss, Huntington, and Miss Musette Hollobaugh were married July 14.

Deaths

Dr. Arthur Kenworthy Hoge, Wheeling, aged 43, died suddenly June 30.

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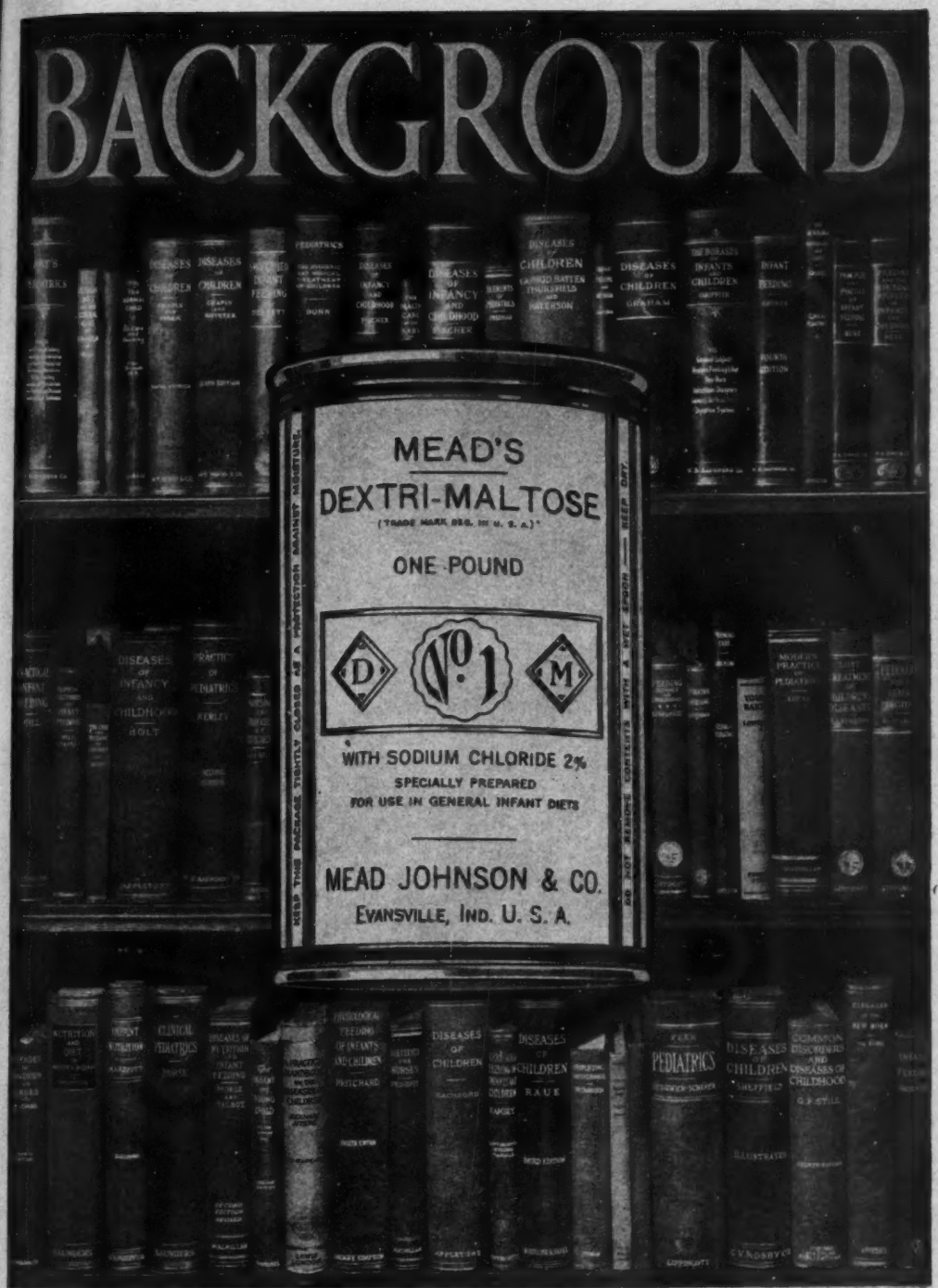

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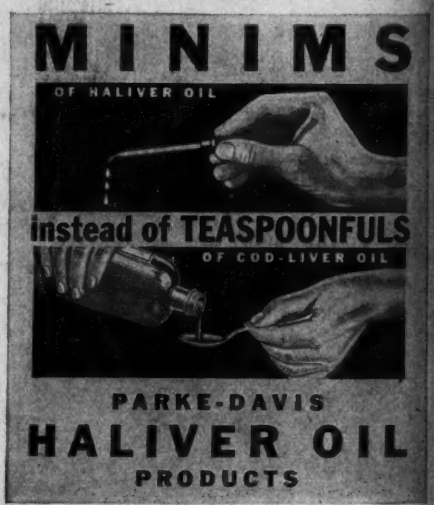

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